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RECENT OSTRACODA FROM PORT PHILLIP BAY, VICTORIA

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Abstract

In a taxonomic study of the Ostracoda from two localities in northern Port Phillip Bay, Victoria, 32 new species are proposed. These are: *Cytherelloidea keiji, Paracypris bradyi, Australoecia victoriensis, Loxocythere hornibrooki, Australocytheridea vandenboldi, Copytus rara, Parakrithella australis, Cytherura taylori, Semicytherura tenuireticulata, S. angusta, S. paenenuda, Hemicytherura seaholmensis, Microcytherura australis, M. gawemuelleri, M. triebeli, Callistocythere puri, C. hartmanni, C. insolita, 'Hemicytheridea' portjacksonensis, Loxoconcha trita, L. gilli, Loxoconchella pulchra, Paradoxostoma romei, P. commune, P. trapezoideum, Cytherois dissimilis, C. bonaducei, Paracytherois portphillipensis, Microcythere macphersoni, Cletocythereis curta, Xestoleberis briggsi,* and *Doratocythere foveata.* In addition, the genera *Australoecia* (type species *Australoecia victoriensis*), *Australocytheridea* (type species *Australocytheidea vandenboldi*), *Ponticocythereis* (type species *Ponticocythereis militaris* (Brady), 1866) and *Doratocythere* (type species *Doratocythere foveata*) are described as new. The study closes with a brief comment on the distinctive features of each faunule.

Introduction

During October 1964, while accompanying Miss H. Macpherson, then Curator of Molluscs at the National Museum of Victoria (now Mrs I. Black), on a field excursion the writer sampled a tide pool at Seaholme. Later in the month, accompanying Miss Macpherson and Dr A. W. B. Powell of the Auckland Museum, he collected from the swash mark at Ricketts Point, near Seaford (Fig. 1). Each collection yielded a rich faunule of ostracode species. Ostracode taxnomy has long been neglected in Australia but it is hoped that this paper, in the centenary year of the first major attempt to describe Australian marine species (Brady 1866) will stimulate the interest of local neontologists and palaeontologists in these fascinating and informative microcrustaceans.

In the descriptions below the conventions RV (right valve) and LV (left valve) are used throughout (Moore, ed. 1961).

Holotypes and paratypes are lodged at the National Museum of Victoria under registered numbers J35-112. In addition, topotypes of the commoner species have been forwarded to the British Museum (Natural History), the United States National Museum, the Henry V. Howe Museum, the Senckenberg Museum and Stazione Zoologica.

As far as is known at present the entire faunule is of Recent age.

Systematic Descriptions

Subclass Ostracoda Latreille, 1806

Order Podocopida Müller, 1894

Suborder Platycopina Sars, 1866

Family Cytherellidae Sars, 1866

Genus **Cytherelloidea** Alexander 1929

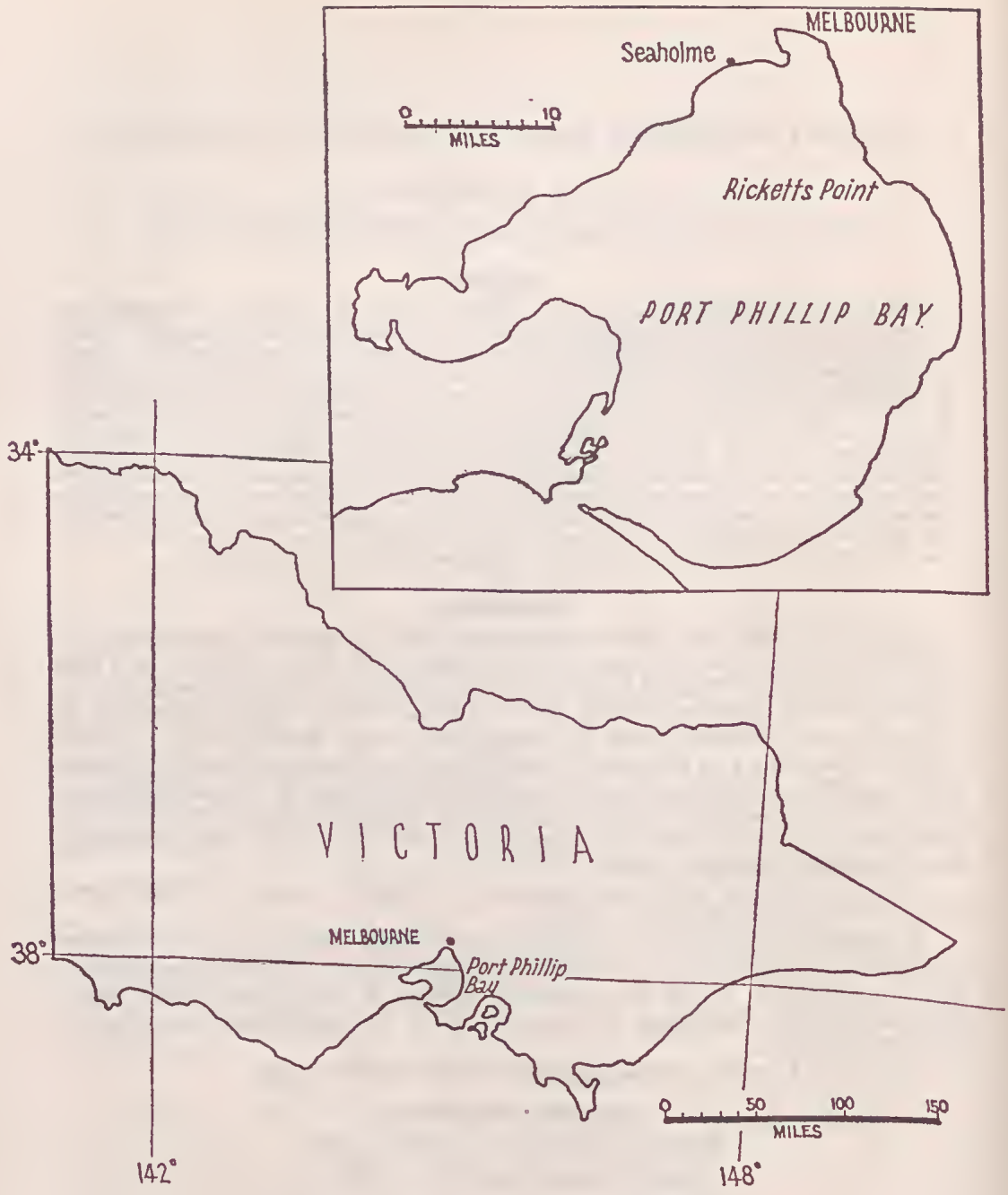

FIG. 1—Locality map of sampling points, Port Phillip Bay, Victoria.

Cytherelloidea keiji sp. nov.

(Pl. 11, fig. 1; Fig. 3p)

(?) *Cytherelloidea* sp. van den Bold, 1963, p. 76, Pl. 1, fig. 8.

DERIVATION OF NAME: For the micropalaeontologist, A. J. Keij, who recently (1964) described several species of *Cytherelloidea* from Neogene to Recent sediments of north-western Borneo.

MATERIAL: Seaholme, 5 individuals; Ricketts Point, 11 individuals.

DIAGNOSIS: Shell medium-large; subrectangular in lateral view; external surface pitted, further ornamented by an antero-marginal ridge and two longitudinal ridges which begin at a tranverse posteromarginal ridge; RV larger than LV, overlapping it strongly in the dorsal region; dorsal margin straight, sloping gently backwards, sinuated antero-dorsally, anterior margin broadly rounded, denticulate; ventral margin sinuated medially, posterior margin subtruncate, rounded above and below, height subequal throughout the length. Internally: lamellae narrow, fused with the shell; radial pore canals absent, but several straight and widely spaced pseudoradial pore canals occur; normal pore canals few, simple, open; muscle scars arranged in the usual biserial cluster, situated sub-centrally on an internal node; hingement modified overlap, LV with a broad based, triangular, toothlike structure at 5/8 the length of the shell (from the anterior) which fits into the RV behind a more gentle anteromedial protrusion of the RV margin. In dorsal view: subcuneate; narrowing anteriorly to a distinct terminal lip (formed by the anteromarginal ridges); greatest breadth at the subtruncate posterior. Sex dimorphism marked, males shorter and much narrower posteriorly than females which possess the usual two internal cavities in the rear of each valve.

DIMENSIONS: Holotype, adult ♀, Nat. Mus. Vic. Reg. No. J35: length 0·70 mm, height 0·40 mm, breadth 0·29 mm; Paratype, adult ♀ (disarticulated), Nat. Mus. Vic. Reg. No. J36: length 0·66 mm, height 0·36 mm; Paratype, adult ♂, Nat. Mus. Vic. Reg. No. J36: length 0·66 mm, height 0·36 mm, breadth 0·21 mm.

TYPE LOCALITY: Swash mark, Ricketts Point.

REMARKS: Keij (1953, p. 156-157, Pl. 1, figs. 1a-b) and van den Bold (*op. cit.*) have discussed and figured species with a similar hingement from eastern Indonesia and New Zealand respectively. This species is in appearance quite unlike Keij's species. It closely resembles the species figured by van den Bold, however, in such features as the ornament of ridges. Possibly, the anterodorsal sinuosity is not as pronounced as in the New Zealand form which also appears to be more coarsely pitted over the surface and more coarsely denticulate anteromarginally.

DISTRIBUTION: New Zealand (?) to south-eastern Australia.

Suborder PODOCOPINA Sars, 1866

Superfamily BAIRDIACEA Sars, 1888

Family BAIRDIIDAE Sars, 1888

Genus **Bairdia** McCoy 1844

Bairdia sp.

(Fig. 2a)

(?) *Bairdia fusca* Brady, 1866; Brady, 1880, p. 49, Pl. 7, figs. 2a-d (not *fusca*).

MATERIAL: Seaholme, 2 individuals; Ricketts Point, 10 individuals.

DIAGNOSIS: Shell medium-large; subtrapezoidal (bairdioid) in lateral view; surface punctate, and hirsute in well preserved individuals, valves denticulate posteroventrally; LV larger than RV, overlapping it strongly in the dorsal region and also ventrally via a median flap; greatest height approximately medial in LV, but anteromedial in RV. Internally: lamellae broad, with large anterior and posterior vestibules; radial pore canals fairly numerous, short and straight; normal pore canals very numerous, pin-shaped, simple; 9 muscle scars arranged in the usual rosette pattern; hingement of ridge and groove type (without terminal teeth or crenulations). In dorsal view: elliptical, with sub-equally acuminate extremities; greatest breadth medial, less than half the height; LV overlap responsible for asymmetry of the valves. Anatomically: not known. Sex dimorphism present, females higher than males.

DIMENSIONS: Nat. Mus. Vic. Reg. No. J37: length 0·90 mm, height 0·56 mm, breadth 0·39 mm; one broken specimen has a length of 0·92 mm.

LOCALITY: Swash mark, Ricketts Point.

REMARKS: Possibly, a form similar to this (collected at Pork Jackson 'Challenger' Station, April 20th, 1874) was identified by Brady with *B. fusca* which he had established previously (1866, p. 364, Pl. 57, figs. 9a-d) from Australian material. The type of *B. fusca*, however, differs from the present species in general shape, patch pattern and muscle scar pattern. Thus it would appear that this species is new, but I am unwilling to base a new name on the specimens available which are all juveniles.

DISTRIBUTION: South-eastern Australia.

Superfamily CYPRIDACEA Baird, 1845

Family CYPRIDIDAE Baird, 1845

Subfamily MACROCYPRIDINAE Müller, 1912

Genus **Macrocyprina** Triebel 1960

Macrocyprina sp.

(?) *Macrocypris maculata* (Brady), 1866; 1880, p. 18.

MATERIAL: Ricketts Point, one damaged LV.

DIMENSIONS: Nat. Mus. Vic. Reg. No. J38: length (estimated) 1·06 mm, height 0·54 mm.

REMARKS: Triebel's recognition of this genus has paved the way for revision of the hoary practice in Victoria of assigning all large lozenge-shaped ostracodes to *Macrocypris* Brady, and worse, to the same species, *M. decora* (Brady), 1866, whether they be of Eocene, Middle or Upper Tertiary or of Recent age. In fact all belong in *Macrocyprina* (usually characterized externally by three discoloured patches on each valve) and exhibit considerable speciation throughout the Tertiary and into the Recent. The genus is usually encountered in temperate to tropical shallow water open ocean environments.

DISTRIBUTION: South-eastern Australia.

Subfamily PARACYPRIDINAE Sars, 1923

Genus **Paracypris** Sars 1866

Paracypris bradyi sp. nov.

(Fig. 2d)

(?) *Paracypris polita* Sars, 1866; Brady, 1880, p. 20.

DERIVATION OF NAME: For George Stewardson Brady, F.R.S. (1832-1921), the pioneer in research on Australian marine ostracodes.

MATERIAL: Seaholme, 8 individuals; Ricketts Point, 29 individuals.

DIAGNOSIS: Shell medium-large; shape elongate-subtriangular in lateral view; surface smooth; colour pale yellowish-brownish; dorsal margin convex, slightly inflexed anterodorsally; anterior margin broadly rounded; ventral margin sinuated medially; posterior subacuminate; greatest height anteromedial, about $\frac{2}{5}$ the length. Internally: lamellae broad anteriorly and posteriorly, narrow ventrally; anterior and posterior vestibules prominent; radial pore canals characteristically branched anteriorly, simple posteriorly; normal pore canals scattered, simple; muscle scars typical, as illustrated; ridge and groove hingement. In dorsal view elliptical, narrow; greatest breadth anteromedial; extremities subacuminate. Anatomically: not known. Sex dimorphism not noted.

DIMENSIONS: Holotype, Nat. Mus. Vic. Reg. No. J39: length 0·78 mm, height 0·29 mm, breadth 0·24 mm; Paratype, Nat. Mus. Vic. Reg. No. J40: length 0·80 mm, height 0·30 mm, breadth 0·24 mm.

TYPE LOCALITY: Swash mark, Ricketts Point.

REMARKS: *Paracypris* is known to be cosmopolitan and most records hitherto (cf. Brady, *op. cit.*) have been referred to the type species. However, at least 3 other species are known from Recent seas. These are: *Paracypris* spec. (Hartmann 1962, p. 176), which occurs off the coast of Chile and may range to Seammon Lagoon, Baja California (McKenzie & Swain, in press), and *Paracypris* spp. (2 species) from Sahul Shelf, off north-western Australia. The Victorian species can be easily differentiated from these on the grounds of shape, size and radial pore canal branching pattern, and is similarly distinguished from Sars' type species as illustrated by him (Sars 1923, Pl. 31). It is noteworthy that these other species all come from sub-littoral to neritic environments which may necessitate modification of the current opinion (van Morkhoven 1963, p. 80) that the genus occurs mainly in deeper (infraneritic to bathyal) waters. It is likely that the controlling factor on the occurrence of *P. bradyi* in Port Phillip Bay is the phytobenthos.

DISTRIBUTION: (?) New Zealand (Wellington Harbour) to south-eastern Australia.

Genus **Phlyctenophora** Brady 1880

Phlyctenophora sp.

MATERIAL: Ricketts Point, 2 individuals.

DIMENSIONS: 1st stage juvenile, Nat. Mus. Vic. Reg. No. J41: length 0·90 mm, height 0·43 mm, breadth 0·35 mm.

LOCALITY: Swash mark, Ricketts Point.

REMARKS: Although it is often considered congeneric with, and a junior synonym of, *Paracypris* Sars (Müller 1912, p. 126, Hartmann 1963, p. 125) I follow van Morkhoven (1963, p. 83) in retaining this genus, since an examination of several species from each of the two genera has confirmed the marked differences in shape, muscle scar pattern and inner lamellae noted by him. Additional to these are the anatomical differences upon which Brady based his new category (1880, p. 32).

DISTRIBUTION: Southern Australia(?).

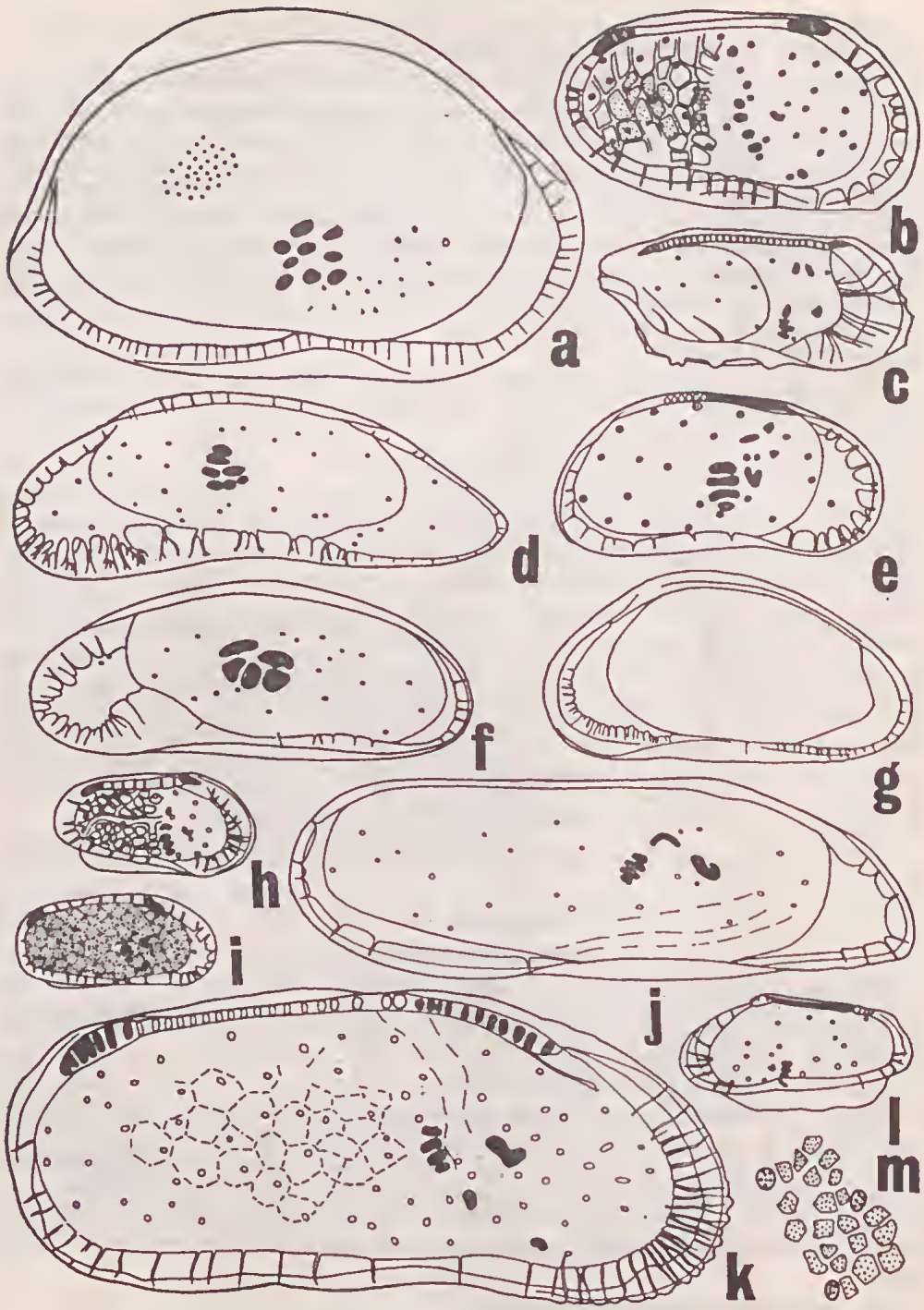

FIG. 2 ⟶

Subfamily PONTOCYPRIDINAE Müller, 1894

Genus **Propontocypris** Sylvester-Bradley 1948

Propontocypris sp.

(Fig. 2g)

MATERIAL: Ricketts Point, 4 individuals.

DIMENSIONS: Juveniles, Nat. Mus. Vic. Reg. No. J42: length 0·54 mm, height 0·28 mm, breadth 0·21 mm.

LOCALITY: Swash mark, Ricketts Point.

REMARKS: The brownish-coloured individuals collected all proved to be juveniles. This is another genus in which distribution appears to be controlled by the phytobenthos.

DISTRIBUTION: South-eastern Australia.

Genus **Australoecia** gen. nov.

DERIVATION OF NAME: L. *Australis* = southern; Gk *oikos* = habitat.

TYPE SPECIES: *Australoecia victoriensis* sp. nov.

DIAGNOSIS: A pontocypridinid genus with a strong carapace of medium-large size, elongate-oval shape, broadly rounded extremities and smooth surface; RV larger than LV; height less than or equalling half the length in all known species; inner lamellae broad, especially anteriorly where there is a large vestibule; radial pore canals usually branched; normal pore canals simple; hinge adont; muscle scars large, 5 in number, arranged in a characteristic radial pattern; in ventral view displaying significant RV overlap.

REMARKS: Unfortunately, after opening several specimens, only fragmentary portions of the anatomy were recovered (Fig. 7, j-m). These show that both the palp of the male 2nd maxilla and the distal furca of the type species of *Australoecia* are most like those illustrated for *Argilloecia cylindrica* and *Argilloecia conoidea* (Sars 1923, Pl. 24, 25) and for the several *Argilloecia* species illustrated by Müller (1894, Pl. 12). There are small differences in these features, however, which suggest the distinctness of *Australoecia*. Palaeontologically, no confusion is possible since in strength of carapace, general shape, details of the inner lamellae, and strong ventral RV overlap *Australoecia* is unlike other genera in the subfamily, while its muscle scar pattern is unique.

DISTRIBUTION: Indo-Pacific to Australasia.

AGE: Tertiary to Recent.

FIG. 2—a, *Bairdia* sp., NMV J37, Internal LV, surface punctation indicated, × 90. b, *Loxocythere harnibrooki* sp. nov., Holotype, NMV J45, Internal LV, surface ornament indicated posteriorly, × 90. c, *Semicytherura* sp., NMV J55, Internal LV, × 90. d, *Paracypris bradyi* sp. nov., paratype, NMV J40, Internal RV, × 90. e, *Parakrithella australis* sp. nov., Holotype, NMV J50, Internal LV, × 90. f, *Australoecia victoriensis* gen. et sp. nov., paratype, NMV J44, Internal RV, × 90. g, *Propontocypris* sp., NMV J42, Internal RV, muscle scars not shown, × 90. h, *Microcytherura gawemuelleri* sp. nov., Paratype, NMV J67, Internal LV, surface ornament indicated posteriorly, × 90. i, *Microcytherura triebeli* sp. nov., Paratype, NMV J69, Internal LV, surface ornament indicated posteromedially, × 90. j, *Copytus rara* sp. nov., Holotype, NMV J49, Internal LV, ventral striations indicated, × 90. k, *Australocytheridea vandenboldi* gen. et sp. nov., Holotype, NMV J47, Internal LV, surface ornament indicated, × 90. l, *Microcytherura australis* sp. nov., Holotype, NMV J64, Internal RV, × 90. m, *M. australis*, same specimen, detail of surface reticulation and normal pore canals, × 180.

Australoecia victoriensis sp. nov.

(Fig. 2f, Fig. 7 j-m)

DERIVATION OF NAME: For the State of Victoria.

MATERIAL: Seaholme, 8 individuals; Ricketts Point, 4 individuals.

DIAGNOSIS: A species of *Australoecia* characterized by medium size; narrowly oblong shape in lateral view; smooth, glistening surface; creamy white to brownish colour; RV overlapping LV around the entire periphery, especially mediovcntrally; dorsal margin gently arched; ventral margin nearly straight, inflexed anteromedially; anterior rounded, narrower than the broadly rounded posterior; greatest height approximately medial, less than half the length. In dorsal view elliptical; greatest breadth medial, less than the height; ends equally subacuminate. Internally: lamellae broad anteriorly, narrower ventrally and posteriorly; vestibules prominent, especially in front where the line of coneresccnces is irregular and a deep anterior vestibule is present; radial pore canals moderately long, wavy and branched in front, but shorter and straighter ventrally and posteriorly; normal pore canals scattered, simple; hinge adont, articulation strong because of RV overlap; muscle scars large, situated centrally, 5 in number, grouped in a loose radial pattern. Anatomically: poorly known (see generic diagnosis above). Sex dimorphism not observed.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J43: length 0·69 mm, height 0·28 mm, breadth 0·25 mm; Paratype, adult ♂, Nat. Mus. Vic. Reg. No. J44: length 0·65 mm, height 0·26 mm, breadth 0·24 mm.

TYPE LOCALITY: Tide pool, Scaholme.

REMARKS: This species is distinguished from some others in the genus, all so far undescribed but known to occur in the Tertiary of Victoria and in the Indo-Pacific (Recent, Sahul Shelf), by its greater length/height ratio and different anterior radial pore canal branching pattern. Its appearance in dorsal view is sufficient to distinguish it from *Aglaia clavata* Brady, which probably also belongs in *Australoecia.*

Family CYTHERIDAE Baird, 1850

Subfamily CYTHERINAE Baird, 1850

Genus **Loxocythere** Hornibrook 1952

Loxocythere hornibrooki sp. nov.

(Pl. 11, fig. 2; Fig. 2b, Fig. 5e, Fig. 7a-i)

DERIVATION OF NAME: For N. de B. Hornibrook, the New Zealand micropalaeontologist.

MATERIAL: Seaholme, 6 individuals; Ricketts Point, 5 individuals.

DIAGNOSIS: A species of *Loxocythere* characterized by medium size; subquadrate shape in lateral view; reticulate carapace, in which the reticules themselves are micro-reticulate or micropunctate (observed under high power), some individuals developing a low posteroventral node; dorsal margin somewhat irregular, subparallel to the ventral margin which is slightly inflexed medially; anterior margin broadly rounded; posterior also broadly rounded but narrower than the anterior; height little more than half the length. In dorsal view: subovate; greatest breadth approximately medial, about half the length. Internally: lamellae moderately broad; anterior vestibule prominent, elongate; radial pore canals short, straight; normal pore canals scattered, sieve-like; hinge hemimerodont, RV with

crenulate terminal teeth and a smooth median furrow, LV complementary; muscle scars comprising 4 oval adductors, a heart-shaped antennal scar, a single mandibular near the anteroventral inner margin, a dorsal scar immediately above the adductors, and at least one other dorsal scar, near the dorsal margin. Anatomically: all limbs strongly developed; 1st antenna 5-jointed; 2nd antenna with a powerful exopodite, and 3 stout claws on the terminal joints of the endopodite; mandibular palp relatively weak, epipod with at least 5 strahlen, coxale strong; maxilla palp elongate-cylindrical, distal joint narrow, lobes similarly elongate-cylindrical; legs increasing in length towards the posterior, terminal claws stout and slightly hooked distally; brush shaped organs equal, less elongate than in *Cythere*; penis very large (245μ in length) and structurally similar to the penis in *Cythere* species. Sex dimorphism not observed.

Dimensions: Holotype, adult, Nat. Mus. Vic. Reg. No. J45: length 0·55 mm, height 0·30 mm, breadth 0·29 mm; paratype, adult, Nat. Mus. Vic. Reg. No. J46: as for the holotype.

Type Locality: Swash mark, Ricketts Point.

Remarks: This species differs from the type species, *L. crassa* Hornibrook, from *L. kingi* Hornibrook and from *L. inflata* Hanai, in shape (*L. crassa* and *L. kingi* are trapezoidal, *L. inflata* has a subacuminate posterior), strength of reticulation (stronger than *L. kingi* or *L. inflata* but weaker than *L. crassa*), and in possessing more radial pore canals and a larger anterior vestibule than any of them. The genus *Tetracytherura* Ruggieri has been put in synonymy with *Loxocythere* by Ruggieri (1959, p. 199) and Hanai (1959b, p. 414) although van Morkhoven (1963, p. 15) maintains that it is not synonymous with *Loxocythere*. However the matter be resolved, *Tetracytherura angulosa* Seguenza, the best known and type species of Ruggieri's genus also differs from the present species in its shape (trapezoidal), very weak reticulation, very small anterior vestibule and fewer radial pore canals.

The diagnosis above contains the first description of anatomic characters for *Loxocythere*. They show it to be a true cytherinid in all features, especially the remarkably large copulatory organs (cf. Sars 1925, p. 168, Pl. 77). This confirms the opinion arrived at earlier on palaeontological grounds by Hornibrook (1952, p. 30).

Distribution: Southern Australia, from Oyster Harbour, near Albany, Western Australia, to Port Phillip Bay, Victoria.

Subfamily Cytherideidinae Sars, 1925

Genus **Australocytheridea** gen. nov.

Derivation of Name: L. *Australis* = southern, and generic name *Cytheridea*.

Type Species: *Australocytheridea vandenboldi* sp. nov.

Diagnosis: A cytheridcidinid genus characterized by large size; transversely oblong shape; denticulate anteroventral margin; dorsomedial sulcus; LV larger than RV; height usually less than half the length; pitted or reticulate surface ornamentation; moderately broad inner lamellae; absence of vestibules; long, wavy, typically unbranched radial pore canals; simple normal pore canals; muscle scars comprising 4 adductors, a V-shaped antennal scar and 2 widely spaced mandibulars; hinge modified antimerodont, consisting in LV of terminal crenulate sockets with a median crenulate *bar*, RV complementary, these elements strengthened (at least in the type

species) by internal antislip ridges. Sex dimorphism present, females shorter than males.

REMARKS: The shape of the new genus is intermediate between those of *Cyprideis* and *Haplocytheridea*, the two genera most closely allied to it. The hingement of the new genus, however, is modified antimerodont, unlike the entomodont hinge of *Cyprideis* or the holomerodont hinge of *Haplocytheridea* (Sandberg 1964, p. 358). Other Cytherideinid genera with antimerodont hingements (Hartmann 1963, p. 72) are easily distinguished from *Australocytheridea* on general shape and also by such features as size, absence of a sulcus, ornamentation, marginal dentation, type of overlap, presence of vestibules, number and type of radial pore canals.

DISTRIBUTION: Southern Australia.

AGE: Neogene—Recent.

Australocytheridea vandenboldi sp. nov.

(Pl. 11, fig. 13; Fig. 2k, Fig. 5j)

DERIVATION OF NAME: For Professor W. A. van den Bold, the ostracode taxonomist, Department of Geology, Louisiana State University.

MATERIAL: Seaholme, 13 individuals; Ricketts Point, 7 individuals.

DIAGNOSIS: A species of *Australocytheridea* with the following distinguishing characteristics: large size; transversely oblong shape in lateral view; surface ornamented everywhere but dorsally by broad shallow pits and a well-marked double sulcus with a narrow median ridge which runs from the mid-dorsum towards the centre of each valve; LV larger than RV, overlapping it dorsally and ventrally, with a slight anterodorsal lip; dorsal margin gently arched; ventral margin inflexed antero-medially; anterior rounded, denticulate anteroventrally, straight to slightly concave anterodorsally; posterior very broadly and evenly rounded; greatest height anteromedial; no eye tubercle or subcentral tubercule; length/height ratio is 2·5 (males), 2·4 (females). Internally: inner lamellae broader anteriorly than ventrally and posteriorly; inner margin and line of concrescence coincident; radial pore canals fairly numerous anteriorly (20-25) but few ventrally and posteriorly, straight to wavy, thickened through most of their length, but thinning near the list; selvage fairly distinct; flange narrow; normal pore canals scattered, simple, issuing near the centre of the surface pits (not along the intervening ridges); muscle scars consisting of 4 adductors, with a large broadly V-shaped antennal scar in front and a relatively large mandibular (?) in front and immediately below, with another smaller mandibular scar in front and further below (near the ventral margin), dorsal scars not observed; hinge modified antimerodont, consisting in LV of an elongate crenulate anterior socket, almost twice as long as the crenulate posterior socket, with an intervening median bar in which the anterior third is more broadly and irregularly crenulate, also slightly more raised, than the posterior portion, RV complementary with a smooth narrow antislip ridge, projecting forwards at a low angle from below the centre of the crenulate anterior element, which fits against a similar ridge in the LV. In dorsal view, the species is subelliptical; narrowing anteriorly, broadly rounded posteriorly; greatest breadth posteromedial, behind the sulcus. Sex dimorphism is evident, with females shorter than males. Anatomically: not known, only empty carapaces collected.

DIMENSIONS: Holotype, adult ♂, Nat. Mus. Vic. Reg. No. J47: length 1·08 mm, height 0·45 mm, breadth 0·41 mm; paratype, adult ♂, Nat. Mus. Vic. Reg. No. J48: length 1·09 mm, height 0·44 mm, breadth 0·41 mm; paratype, adult ♀, Nat. Mus. Vic. Reg. No. J48: length 1·00 mm, height 0·43 mm, breadth 0·41 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: There are no described species with which this form can be confused, although it is slightly similar to species of *Cushmanidea* Blake, described from Japan (Hanai 1959a) and some species of *Haplocytheridea* described from the Americas (Sandberg 1964). The hingement, sulcus, lamellae, radial pore canals all separate the present species from these others.

Australocytheridea has yet to be collected from the open ocean, outside Port Phillip Bay, and may be restricted to protected shallow water marine environments. It is my opinion that *Australocytheridea* probably occupies in Australia the niche colonized by *Haplocytheridea* in America, but van den Bold (personal communication) feels that it would be more correct to posit that it occupies a niche similar to that of *Cushmanidea* in America.

DISTRIBUTION: Southern Australia.

Subfamily NEOCYTHERIDEIDINAE Puri, 1957

Genus **Copytus** Skogsberg 1939

Copytus rara sp. nov.

(Fig. 2j)

DERIVATION OF NAME: L. *Rara* = rare, for its infrequent occurrence in the collections.

MATERIAL: Seaholme, 3 individuals.

DIAGNOSIS: A species of *Copytus* characterized by medium-large size; narrowly elongate shape in lateral view; surface smooth, except ventrally in adults where there are several faint striae; dorsal margin straight; ventral margin parallel, inflexed anteromedially; anterior subacuminate; posterior broadly rounded; height subequal throughout the length, equalling about $\frac{1}{3}$ the length. In dorsal view narrowly ovate; greatest breadth approximately medial. Internally: lamellae broad in front, narrower ventrally and behind; vestibules prominent, anterior vestibule broad, posterior vestibule elongate; radial pore canals few, short, straight; normal pore canals scattered, simple; hinge adont; muscle scars grouped anteromedially, comprising at least 4 adductors, a V-shaped antennal scar and an intermediate fulcral 'scar', mandibular and dorsal scars not seen. Anatomically: unknown. Sex dimorphism not observed.

DIMENSIONS: Holotype, adult LV, Nat. Mus. Vic. Reg. No. J49: length 0·95 mm, height 0·30 mm, breadth 0·30 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: The simple normal pore canals and adont hinge separate this genus from *Neocytherideis* Puri (sieve-like normal pore canals, lophodont hinge, cf. van Morkhoven 1963, p. 331, 336). Previously, the only described species referred to *Copytus*, other than the type species, *C. caligula*, was *Cytherideis laevata* Brady, 1880 (cf. Skogsberg 1939, p. 425). Recently, another species, *Copytus elongata*, has been described (Benson 1964a, p. 16-17, Fig. 9). All three are smooth forms whereas *C. rara* is striate ventrally. A fourth undescribed species, from the Sahul Shelf, is much smaller than the present material, has a different radial pore canal pattern, and is not striate ventrally (Swain & McKenzie, unpublished data).

DISTRIBUTION: South-eastern Australia to New Zealand (collected off Three Kings Island, material supplied by Hornibrook).

Subfamily KRITHINAE Mandelstam, 1958

Genus **Parakrithella** Hanai 1959

Parakrithella australis sp. nov.

(Fig. 2e, Fig. 7 n-o)

Parakrithella sp. McKenzie, 1964, p. 448-453.

DERIVATION OF NAME: L. *Australis* = southern.

MATERIAL: Seaholme, 7 individuals; Ricketts Point, 10 individuals.

DIAGNOSIS: A species of *Parakrithella* characterized by small-medium size, elongate—oblong shape in lateral view; smooth surface; pallid to pale brownish colour; dorsal margin straight; ventral margin inflexed anteromedially; anterior broadly rounded; posterior subcuncate; height subequal throughout the length and a little less than half the length. In dorsal view narrowly ovate; greatest breadth medial, about $\frac{2}{5}$ the length. Internally: lamellae broad anteriorly, narrow ventrally and posteriorly; anterior vestibule large, line of concrescence scalloped; posterior vestibule elongate, narrow; radial pore canals fairly numerous, branched anteromarginally; normal pore canals scattered, sieve-like; hinge modified adont, in LV consisting of a long shallow crenulate anterior groove followed by a short crenulate bar (as illustrated), RV complementary; muscle scars large, comprising 4 adductors, a large V-shaped antennal scar, and 3 dorsal scars (mandibular not seen). Anatomically: imperfectly known, only fragments found in the specimens opened but the stout joints of the 2nd antenna endopodite are characteristic of this genus (Hartmann 1962, p. 191) and indeed of the subfamily. Sex dimorphism present, females higher and broader than males.

DIMENSIONS: Holotype, adult ♀, Nat. Mus. Vic. Reg. No. J50: length 0·50 mm, height 0·24 mm, breadth 0·20 mm; paratype, adult ♀, Nat. Mus. Vic. Reg. No. J51: length 0·48 mm, height 0·20 mm, breadth 0·18 mm; paratype, adult ♂, Nat. Mus. Vic. Reg. No. J51: length 0·49 mm, height 0·23 mm, breadth 0·19 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: At least three species of *Parakrithella* have been described, two from the margins of the Pacific (Japan and Chile) while the third is known to occur in the faunules of Pacific Islands in the Indo-Pacific. This record extends the distribution of this genus to the Australian region. Although there are few obvious differences in external shell features, *Parakrithella australis* can be easily separated from *P. notadonta* Hanai, the type species, *P. hanai* Hartmann and *P. flavescens* (Brady) on the bases of its different radial pore canal and normal pore canal patterns.

DISTRIBUTION: Southern Australia, from Oyster Harbour, near Albany, Western Australia, to Port Phillip Bay, Victoria.

Subfamily CYTHERURINAE G. W. Müller, 1894

Genus **Cytherura** Sars 1866

Cytherura taylori sp. nov.

(Pl. 11, fig. 3; Fig. 3g, Fig. 9a-g)

DERIVATION OF NAME: For Mr D. J. Taylor, foraminiferan micropalaeontologist and biostratigrapher, Victorian Mines Department.

MATERIAL: Seaholme, 17 individuals.

DIAGNOSIS: A *Cytherura* species of small size; subrectangular shape in lateral view; ventrally inflated (typical of the subfamily); with a finely reticulate surface,

further ornamented by a flexuous median riblet, a medioventral riblet and by one or two weak riblets near the ventral margin; dorsal and ventral margins subparallel, nearly straight; anterior broadly rounded; posterior produced in a short subdorsal cauda; height about half the length; eye tubercles weakly developed. In dorsal view subhastate; subacuminate in front and terminating behind in the cauda; greatest breadth approximately medial, just over ⅓ the length. Internally: lamellae of moderate width anteriorly (typical of the genus) and deeply incurved posteriorly; vestibules absent; anterior radial pore canals short and wavy—some branched terminally —posterior radial pore canals few in number but including the long, wavy, terminally forked pore canal which characterizes this subfamily; normal pore canals obscure, apparently simple; LV hinge consisting of short, narrowly triangular furrows on either side of a median bar which is strongly crenulate (4 or 5 times) at either end and weakly crenulate in the middle, RV complementary; muscle scars comprising 4 adductors and an antennal scar, mandibular and dorsal scars not observed. Anatomically: 2nd antenna with an elongate, double-jointed exopodite; mandible coxale with powerful masticatory teeth, epipod a single long bristle; legs increasing in length posteriorly; with the usual hand-shaped posteroventral process and terminal bristle on the end of the female body; penis structure unknown. Sex dimorphism present, females broader and higher than males.

Dimensions: Holotype, adult ♀, Nat. Mus. Vic. Reg. No. J52: length 0·38 mm, height 0·19 mm, breadth 0·20 mm; paratype, adult ♀, Nat. Mus. Vic. Reg. No. J53: as for holotype; paratype, adult ♂, Nat. Mus. Vic. Reg. No. J53; length 0·38 mm, height 0·16 mm, breadth 0·15 mm.

Type Locality: Tide pool, Seaholme.

Remarks: The species is easily distinguished, on surface ornamentation alone, from the Australian 'Challenger' species (Brady, 1880, p. 131, 134) and the several species described by Hornibrook (1952, p. 50, 51). The diversity of cytherurids in Port Phillip Bay is consistent with, and complements, their known diversity world-wide in shallow-water marginal environments.

Distribution: South-eastern Australia.

Genus **Semicytherura** Wagner 1957

Semicytherura cryptifera (Brady) 1880

(Pl. 11, fig. 4; Fig. 3e)

Cytherura cryptifera Brady, 1880, p. 134, Pl. 32, figs. 4a-c.

Material: Seaholme, 2 individuals.

Dimensions: Hypotypes, Nat. Mus. Vic. Reg. No. J54; length 0·45 mm, height 0·23 mm, breadth 0·27 mm; length 0·43 mm, height 0·23 mm, breadth 0·24 mm.

Remarks: The striking sculpture allows no doubt of the identity of this form with Brady's species. Internally, as the figure shows, it is a typical *Semicytherura*.

Distribution: South-eastern Australia. The holotype came from Challenger Station 162, off East Moncoeur Island, Bass Strait.

Semicytherura sp.

(Pl. 11, fig. 5; Fig. 2c)

Material: Ricketts Point, 1 adult LV.

Dimensions: Nat. Mus. Vic. Reg. No. J55: length 0·46 mm, height 0·21 mm, breadth (estimated) 0·25 mm.

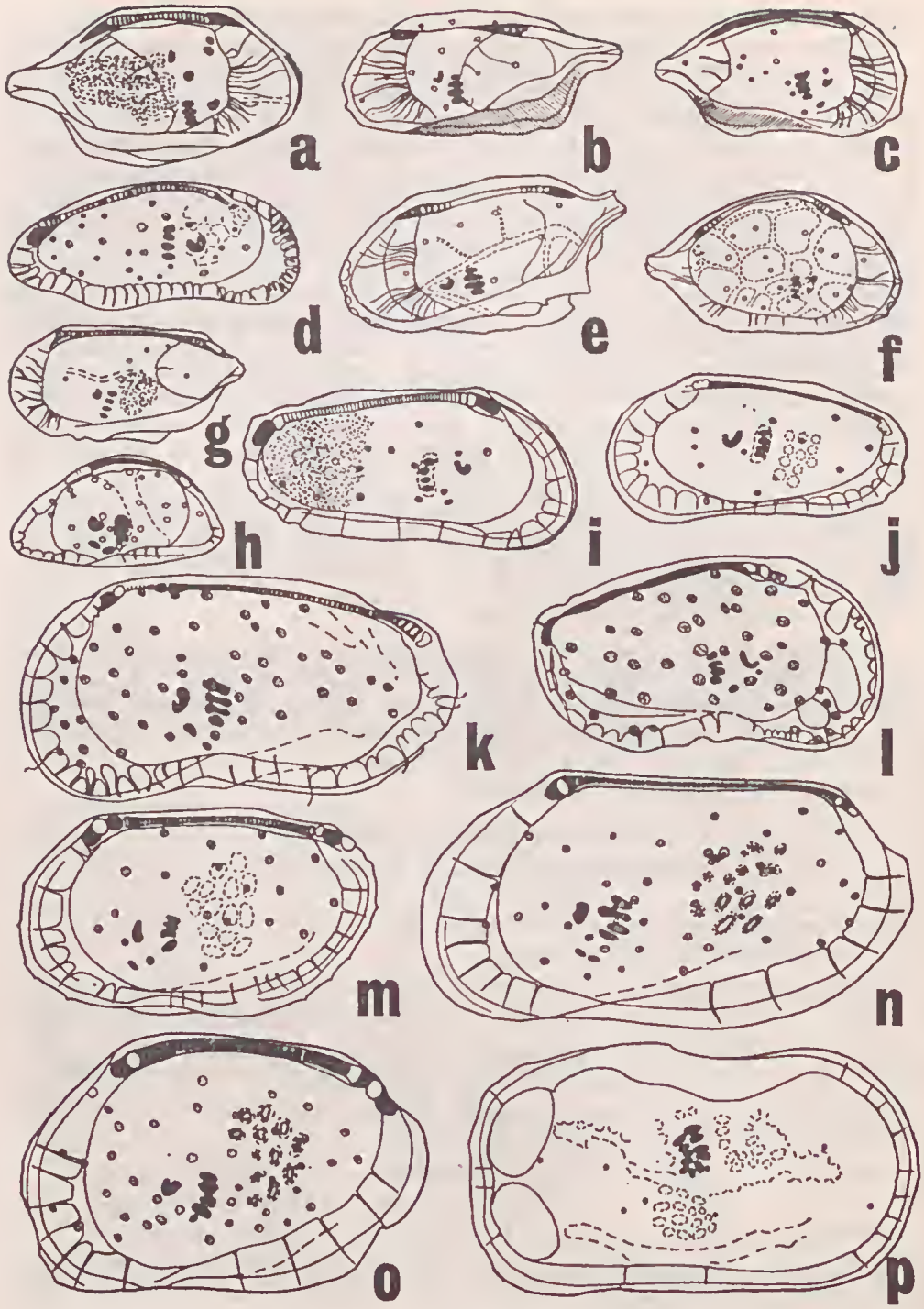

FIG. 3 ⟶

REMARKS: The form is sufficiently distinct to separate this from all previously described Australasian species but unfortunately only the one empty valve was recovered. The figures are considered to be adequately descriptive for the present.

DISTRIBUTION: South-eastern Australia.

Semicytherura tenuireticulata sp. nov.

(Pl. 11, fig. 7; Fig. 3a)

DERIVATION OF NAME: For the fine surface reticulation—L. *tenuis* = fine, *L. reticulus* = a small net.

MATERIAL: Seaholme, 9 individuals; Ricketts Point, 3 individuals.

DIAGNOSIS: A *Semicytherura* characterized by small size; subovate shape in lateral view; surface ornamented mostly by a micropunctate fine reticulation but with weak anastomosing riblets present ventrally where the shell is inflated; dorsum arched; venter nearly straight; anterior rounded; posterior produced in a short subdorsal cauda; greatest height approximately medial, more than half the length. In dorsal view, lanceolate; greatest breadth medial, less than half the length. Internally: lamellae broad anteriorly and deeply incurved posteriorly; radial pore canals wavy, tending to be grouped anteriorly, few posteriorly (but including the usual long terminally forked pore canal); hinge slightly atypical, LV with terminal narrowly triangular grooves—weakly crenulate under high power observation—and a strong median bar, the ends of which are not conspicuously crenulate as in most species but appear to be weakly crenulate like the rest of the bar when viewed under high power; muscle scars comprising 4 adductors, an antennal scar and 4 dorsal scars, mandibular not seen; inner flange denticulate. Anatomically unknown. Sex dimorphism obscure.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J56: length 0·46 mm, height 0·25 mm, breadth 0·20 mm; paratype, adult LV, Nat. Mus. Vic. Reg. No. J57: length 0·46 mm, height 0·25 mm; paratype, adult, Nat. Mus. Vic. Reg. No. J57: length 0·45 mm, height 0·24 mm, breadth 0·21 mm.

TYPE LOCALITY: Tide pool, Seaholme.

FIG. 3—a, *Semicytherura tenuireticulata* sp. nov., Paratype, NMV J57, Internal LV, surface ornament indicated posteriorly, × 90. b, *Semicytherura angusta* sp. nov., Holotype, NMV J58, Internal RV, × 90. c, *Semicytherura paenenuda* sp. nov. Paratype, NMV J61, Internal LV, × 90. d, *Leptocythere* cf. *vellicata* (Brady), Holotype, NMV J70, Internal LV, × 90. e, *Semicytherura cryptifera* (Brady), Hypotype, NMV J54, Internal RV, trace of major ribs indicated, × 90. f, *Hemicytherura seaholmensis* sp. nov., Paratype, NMV J63, Internal LV, surface ornament indicated, × 90. g, *Cytherura taylori* sp. nov., Paratype, NMV J53, Internal RV, surface ornament indicated posteroventrally, × 90. h, *Microcythere macphersoni* sp. nov., Paratype, NMV J99, Internal RV, trace of surface sulcus indicated, × 90. i, *'Hemicytherideа' portjacksonensis* sp. nov., ♀ Hypotype, NMV J76, Internal LV, surface ornament indicated posteriorly, × 90. j, *'H.' portjacksonensis*, ♂ Hypotype, NMV J76, Internal RV, surface ornament indicated posteriorly (micropunctation not shown), × 90. k, *Callistocythere insolita* sp. nov., Holotype, NMV J74, Internal RV, × 90. l, *Callistocythere puri* sp. nov. Hypotype, NMV J71, Internal LV, × 90. m, *Loxoconcha trita* sp. nov., Holotype, NMV J80, Internal RV, surface ornament indicated posteromedially, × 90. n, *Loxoconcha australis* Brady, ♂ Hypotype, NMV J77, Internal RV, surface ornament indicated posteromedially, × 90. o, *L. australis* Brady, ♀ Hypotype, NMV J77, Internal RV, surface ornament indicated posteromedially, × 90. p, *Cytherelloidea keiji* sp. nov., Paratype, NMV J36, Internal LV, surface ornament indicated, × 90.

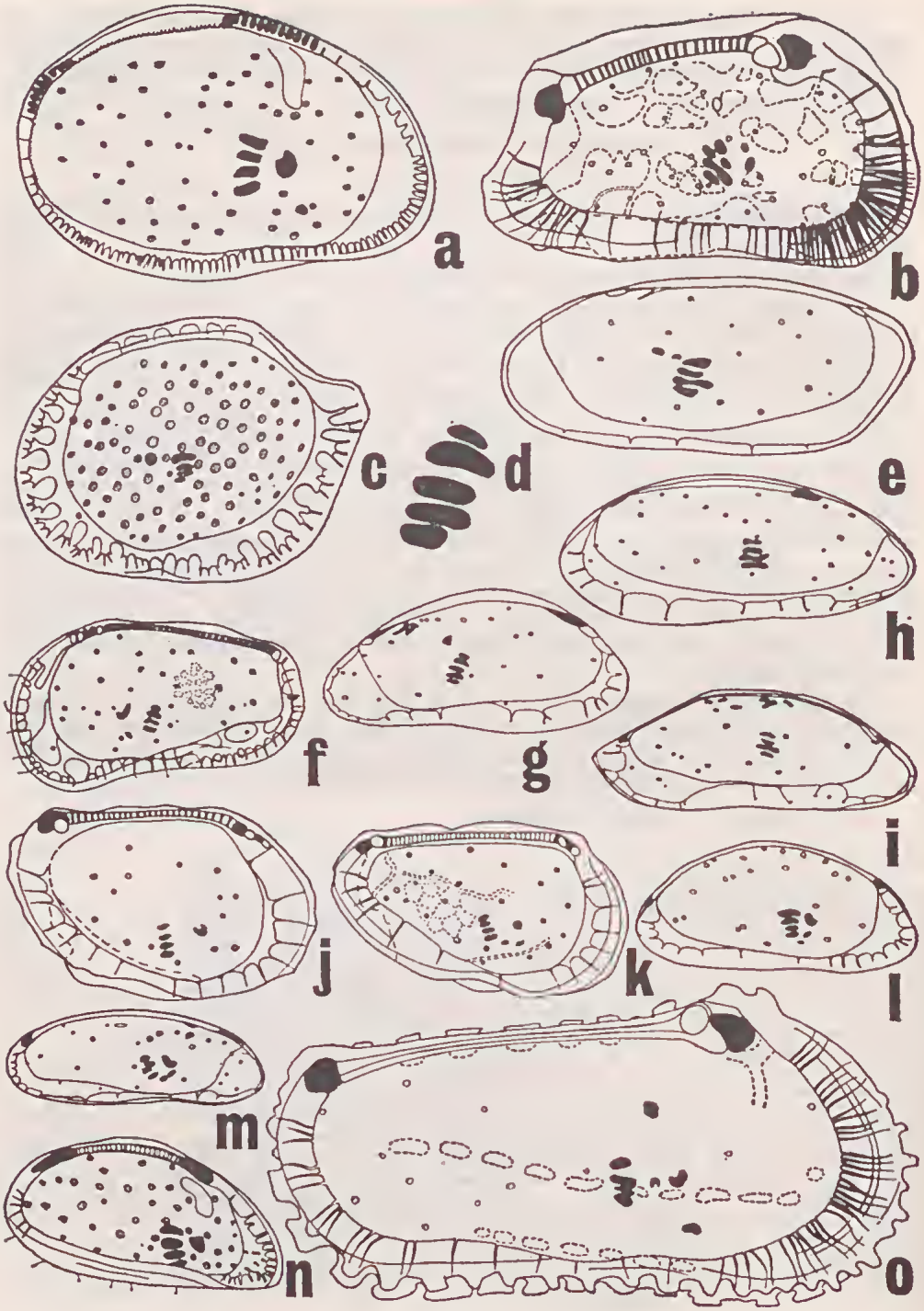

FIG. 4 ⟶

REMARKS: The species is reminiscent of *S. mucronata* (Brady), 1880, described from Simons Bay, South-west Africa, in general shape and dorsal view but has a very different surface ornamentation. None of Hornibrook's New Zealand species resemble it at all.

DISTRIBUTION: South-eastern Australia.

Semicytherura angusta sp. nov.

(Pl. 11, fig. 6; Fig. 3b)

DERIVATION OF NAME: For its slender lateral and dorsal profiles—L. *angusta* = narrow.

MATERIAL: Seaholme, 4 individuals.

DIAGNOSIS: A species of *Semicytherura* characterized by small size; subrectangular shape in lateral view (discounting the prominent posterior caudal process); ornamentation consisting of a rib which forks medioventrally, one arm continuing ventrally the other trending posterodorsally, and a low rim which follows the dorsal and anterior margins, the rib obscure under reflected light but evident under transmitted light (specimen immersed in glycerine); dorsal and ventral margins subparallel, former straight, latter sinuated medially; anterior rounded, denticulate with up to 4 denticles; posterior produced in a long subdorsal cauda; height subequal throughout the length and less than $\frac{1}{2}$ the length. In dorsal view subhastate; compressed anteriorly, each valve slightly depressed medially, and subtruneate posteriorly; cauda equalling $\frac{1}{3}$ the length. Internally: as illustrated, typical of the genus, with terminal elements of the LV median bar strongly crenulate, rest of the bar weakly crenulate. Sex dimorphism present, females higher than males.

DIMENSIONS: Holotype, adult ♂, Nat. Mus. Vic. Reg. No. J58: length 0·43 mm, height, 0·18 mm, breadth 0·18 mm; paratype, adult ♀, Nat. Mus. Vic. Reg. No. J59: length 0·43 mm, height 0·20 mm, breadth 0·16 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: The shape of this species in lateral view recalls that of *Cytherura costellata* Brady, as figured by Hornibrook (1952, p. 50, Pl. 14, figs. 229, 230, 233, 234), probably not the same species as Brady's (1880, p. 134, Pl. 32, figs. 7a-d) which was collected at Balfour Bay, Kerguelen Island, 'Challenger' Station 149. The surface ornamentation of this species, however, and its appearance in dorsal view differ considerably from both these forms.

DISTRIBUTION: South-eastern Australia.

FIG. 4—a, *Xestoleberis tigrina* (Brady), ♀ Hypotype, NMV J105, Internal LV, × 90. b, *'Ambostracon' pumila* (Brady), Hypotype, NMV J100, Internal LV, trace of surface ribbing indicated, × 90. c, *Loxoconchella pulchra* sp. nov., ♀ Paratype, NMV J85, Internal RV, × 90. d, *Paracytherois portphillipensis* sp. nov., Holotype, NMV J96, detail adductor muscle scars, × 180. e, *Paradoxostoma romei* sp. nov., Paratype, NMV J87, Internal RV, × 90. f, *Callistocythere hartmanni* sp. nov., Holotype, NMV J72, Internal RV, × 90. g, *Paracytherois portphillipensis* sp. nov., Holotype, NMV J96, Internal RV, × 90, h, *Paradoxostoma commune* sp. nov., Topotype, Internal LV, × 90. i, *Paradoxostoma trapezoideum* sp. nov., Topotype, Internal LV, × 90. j, *Loxoconcha* cf. *variolata* Brady, Hypotype, NMV J79, Internal LV, × 90. k, *Loxoconcha gilli* sp. nov., Paratype, NMV J83, Internal LV, surface ornament partly indicated, × 90. l, *Cytherois dissimilis* sp. nov., Holotype, NMV J92, Internal LV, × 90. m. *Cytherois bonaducei* sp. nov., Paratype, NMV J95, Internal LV, × 90. n, *Xestoleberis briggsi* sp. nov., Holotype, NMV J106, Internal LV, × 90. o, *Ponticocythereis militaris* (Brady), gen. nov. ♂ Hypotype, NMV J104, Internal LV, trace of ridges indicated, × 90.

Semicytherura paenenuda sp. nov.

(Fig. 3c)

DERIVATION OF NAME: For its almost bare surface—L. *paene* = almost, L. *nuda* = naked.

MATERIAL: Seaholme, 5 individuals.

DIAGNOSIS: A species of *Semicythereura* of small size; subquadrate shape in lateral view; RV distinctly larger than LV, overlapping it dorsally; bare of surface ornamentation except for a few indistinct anteroventral riblets; dorsal margin convex, more strongly so in RV; venter situated medially; anterior broadly rounded, posterior produced in a short mediodorsal process; greatest height medial, about half the length. In dorsal view sublanceolate; greatest breadth medial; anterior flattened terminally. Internally: posterior lamellae not incurved as deeply as in the species described above; median bar of the LV hingement crenulate throughout, scarcely differentiated terminally; otherwise similar to previous species. Anatomically not known. Females shorter and relatively higher than males.

DIMENSIONS: Holotype, adult ♂, Nat. Mus. Vic. Reg. No. J60: length 0·39 mm, height 0·19 mm, breadth 0·15 mm; paratype, adult ♀, Nat. Mus. Vic. Reg. No. J61: length 0·36 mm, height (LV) 0·17 mm, (RV) 0·19 mm, breadth 0·15 mm; paratype adult ♂, Nat. Mus. Vic. Reg. No. J61: length 0·38 mm, height 0·19 mm, breadth 0·16 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: In length this species could be confused with a 1st stage instar of *S. tenuireticulata* but, apart from its ornamentation, can be differentiated by its narrower posterior lamellae (in which the upper radial pore canals trend towards the cauda rather than posteroventrally), thicker anterior radial pore canals, and longer LV hinge bar.

DISTRIBUTION: South-eastern Australia.

Genus **Hemicytherura** Elofson 1941

Hemicytherura seaholmensis sp. nov.

(Pl. 11, fig. 8; Fig. 3f)

DERIVATION OF NAME: For the type locality.

MATERIAL: Seaholme, 25 individuals.

DIAGNOSIS: A *Hemicytherura* species of small size; subovate shape in lateral view; ornamented by broad, deep reticules; colour brownish; RV higher than LV, overlapping it dorsally; dorsum strongly arched; venter nearly straight; anterior rounded, narrowing anteroventrally where it is denticulate (3 or 4 denticles); posterior produced in a short mediodorsal process; greatest height approximately medial, about $\frac{3}{5}$ the length. In dorsal view sublanceolate; compressed. Internally: lamellae moderately broad, inner margin regular; radial pore canals wavy, grouped (especially anteroventrally); normal pore canals scattered, simple; LV hinge consisting of weakly crenulate, narrowly triangular terminal furrows and a strong median bar, smooth in the middle but strongly crenulate at each end; muscle scars comprising 4 adductors and a single rounded antennal scar, mandibular and dorsal scars not seen. Anatomically unknown. Females slightly shorter and higher than males.

DIMENSIONS: Holotype, adult ♂, Nat. Mus. Vic. Reg. No. J62: length 0·39 mm, height 0·23 mm, breadth 0·16 mm; paratype, adult ♀, Nat. Mus. Vic. Reg. No.

J63: length 0·37 mm, height 0·24 mm, breadth 0·16 mm; paratype, adult ♂, Nat. Mus. Vic. Reg. No. J63: length 0·38 mm, height (LV) 0·21 mm, (RV) 0·23 mm, breadth 0·16 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: Several species closely resemble the form described above. They include: *H. cellulosa* (Norman), *H. videns videns* (Müller), *H. videns aegyptica* Hartmann, and *H. cranekeyensis* Puri, from the North Atlantic, Mediterranean, Red Sea and coast of Florida respectively. The species group, therefore, has a cosmopolitan distribution and is commonly associated with the algal phytobenthos in shallow water (often protected) marginal marine environments. The present species is defined on the basis of consistent differences in surface ornamentation (number and shape of reticules) with respect to other members of the group. The closest New Zealand species are *H. fereplana* Hornibrook and *H. pentagona* Hornibrook. The first of these has many more reticules posterodorsally than the present species, while the other has fewer reticules, and these arranged in a different pattern.

DISTRIBUTION: South-eastern Australia.

Genus **Microcytherura** G. W. Müller 1894

Microcytherura australis sp. nov.

(Pl. 11, fig. 11; Fig. 2 l-m)

DERIVATION OF NAME: L. *Australis* = southern.

MATERIAL: Seaholme, 36 individuals; Ricketts Point, 3 individuals.

DIAGNOSIS: A species of *Microcytherura* characterized by small size; heavily calcified shell; strong ventral inflation; subrectangular shape in lateral view; surface micropunctate and finely reticulate, with a prominent ventral ridge which reaches its peak posteroventrally; LV overlapping RV posterodorsally; dorsal and ventral margins straight, subparallel (especially in LV); anterior rounded; posterior more accuminate in RV than LV; greatest height medial, less than half the length. In dorsal view subtrullate; greatest breadth more than half the length. Internally: lamellae moderately broad; inner margin regular, coinciding with line of concrescence; radial pore canals unbranched, widened at their bases; normal pore canals, scattered, sieve-like; RV hinge consisting of crenulate anterior and posterior teeth with a weakly crenulate furrow between them, LV complementary; muscle scars including 4 adductors and an heart-shaped antennal scar, others not seen. Anatomically unknown. Sex dimorphism weakly developed, males less broad than females.

DIMENSIONS: Holotype, adult ♂, Nat. Mus. Vic. Reg. No. J64: length 0·35 mm, height 0·16 mm, breadth 0·20 mm; paratype, adult ♂, Nat. Mus. Vic. Reg. No. J65: length 0·34 mm, height 0·16 mm, breadth 0·20 mm; paratype, adult ♀, Nat. Mus. Vic. Reg. No. J65: length 0·35 mm, height 0·17 mm, breadth 0·23 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: This species is separated from others in the genus by its greater length/height ratio, weakly crenulate median hinge element and distinctive surface ornamentation. The heavily calcified shell of this and the next species is not typical in *Microcytherura* which is usually described as possessing a somewhat fragile to moderately calcified carapace. Further, the median hinge element of *Microcytherura* species is usually smooth. In other features, however, such as type of ornamentation, ventral inflation, inner lamellae, radial pore canals, normal pore canals and muscle scars, these species conform with typical *Microcytherura*.

DISTRIBUTION: South-eastern Australia.

Microcytherura gawemuelleri sp. nov.

(Pl. 11, fig. 12; Fig. 2h; Fig. 5c)

DERIVATION OF NAME: For G. W. Müller who first defined the genus.

MATERIAL: Seaholme, 7 individuals; Ricketts Point, 3 individuals.

DIAGNOSIS: A species of *Microcytherura* of small size; subquadrate shape in lateral view; heavily calcified shell characterized by strong ventral inflation; surface ornament of numerous, closely set, small, deep pits and a median riblet which makes an 'U' in the posteroventral part of the carapace; posterior subtruncate in LV, but produced in a weak medioventral cauda in RV; greatest height anteromedial, about half the length. In dorsal view subdeltoid in shape; valve outlines inflexed behind points of greatest breadth. Internally: generally similar to the previous species but with a stronger hinge, a questionable anterior vestibule (very small if present), and a single dorsal muscle scar in addition to the scars described for *M. australis*. Anatomically unknown. Sex dimorphism not observed.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J66: length 0·31 mm, height 0·15 mm, breadth 0·21 mm; paratype, adult, Nat. Mus. Vic. Reg. No. J67: length 0·30 mm, height 0·15 mm, breadth 0·20 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: The ornamentation distinguishes this species from *M. nigrescens* Müller (the type species), *M. fulva* (Brady and Robertson), and the previous species.

DISTRIBUTION: South-eastern Australia.

Microcytherura triebeli sp. nov.

(Fig. 2i)

DERIVATION OF NAME: For Professor Erich Triebel, who kindly provided comparative data on the genus *Nannocythere* Schafer.

MATERIAL: Seaholme, 9 individuals.

DIAGNOSIS: A species of *Microcytherura* characterized by small size; elongate oblong shape in lateral view; ventral inflation; finely reticulate and micropunctate surface ornamentation; subparallel dorsal and ventral margins; broadly rounded anterior; subtruncate posterior; height less than half the length. In dorsal view narrowly subovate; greatest breadth posteromedial; anterior subcuminate; posterior rounded. Internally: lamellae moderately broad anteriorly, narrower ventrally and posteriorly; anterior vestibule well developed; radial pore canals short, widened at their bases; normal pore canals scattered, open (?); RV hinge with crenulate terminal teeth and a (?) weakly crenulate medial furrow, LV complementary; muscle scars consisting of 4 adductors, an antennal scar and two mandibulars, dorsal scars not seen. Anatomically unknown. Sex dimorphism present, males smaller than females.

DIMENSIONS: Holotype, adult ♀, Nat. Mus. Vic. Reg. No. J68: length 0·33 mm, height 0·15 mm, breadth 0·15 mm; paratype, adult ♂, Nat. Mus. Vic. Reg. No. J69: length 0·26 mm, height 0·14 mm, breadth 0·14 mm; paratype, adult ♀, Nat. Mus. Vic. Reg. No. J69: length 0·30 mm, height 0·14 mm, breadth 0·14 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: The prominent anterior vestibule is diagnostic in separating this genus from the other *Microcytherura* spp. described here, on shell characters.

DISTRIBUTION: South-eastern Australia.

Subfamily LEPTOCYTHERINAE Hanai, 1957

Genus **Leptocythere** Sars 1925

Leptocythere cf. **vellicata** (Brady) 1880

(Fig. 3d)

Cythere vellicata Brady, 1880, p. 64, Pl. 12, figs. 2a-d.

MATERIAL: Seaholme, 18 individuals.

DIMENSIONS: Hypotypes, adults, Nat. Mus. Vic. Reg. No. J70: length 0·44 mm, height 0·18 mm, breadth 0·16 mm; length 0·43 mm, height 0·19 mm, breadth 0·18 mm.

REMARKS: With few exceptions all the specimens examined bear some surface punctation, which Brady specifically excluded in his description. They are, however, so closely similar to his species (collected at Port Jackson, Sydney, April 20th, 1874) in other respects, that a tentative referral appears warranted.

DISTRIBUTION: South-eastern Australia.

Genus **Callistocythere** Ruggieri 1953

Callistocythere puri sp. nov.

(Pl. 12, fig. 2; Fig. 31)

Cythere canaliculata (Reuss), 1850; Brady, 1866, p. 373, Pl. 59, figs. 4a-f; 1880, p. 73, Pl. 14, figs. 7a-d (not *canaliculata*).

DERIVATION OF NAME: For Dr Harbans Puri of the Florida Geological Survey, who is at present revising Brady's 'Challenger' collection.

MATERIAL: Seaholme, 15 individuals; Ricketts Point, 10 individuals.

DIMENSIONS: Hypotypes, adults, Nat. Mus. Vic. Reg. No. J71: length 0·53 mm, height 0·30 mm, breadth 0·29 mm; length 0·51 mm, height 0·28 mm, breadth 0·28 mm.

REMARKS: The original specimen, upon which Brady based his identification, was collected at Hobsons Bay. The 'Challenger' material came from off East Moncoeur Island, Bass Strait, and from Port Jackson. It is evidently the same species as that from Hobsons Bay, but not the European Tertiary species described by Reuss, from which it can be distinguished readily on features of the surface ornamentation alone. On similar grounds, the Australian specimens can be separated from the Mediterranean Neogene-Recent species *Callistocythere flavidofusca* (Ruggieri), 1950, which has also been equated with Brady's Hobsons Bay form (Ruggieri 1953, p. 99).

DISTRIBUTION: South-eastern Australia to (?) New Zealand. (*Leptocythere* aff. *canaliculata* (Reuss), in Hornibrook 1952, p. 17).

Callistocythere hartmanni sp. nov.

(Pl. 12, fig. 5; Fig. 4f; Fig. 8 a-h)

DERIVATION OF NAME: For Dr Gerd Hartmann of the Hamburg Museum, presently working on the ostracode section of Bronn's 'Klassen des Tierreichs'.

MATERIAL: Seaholme, 8 individuals.

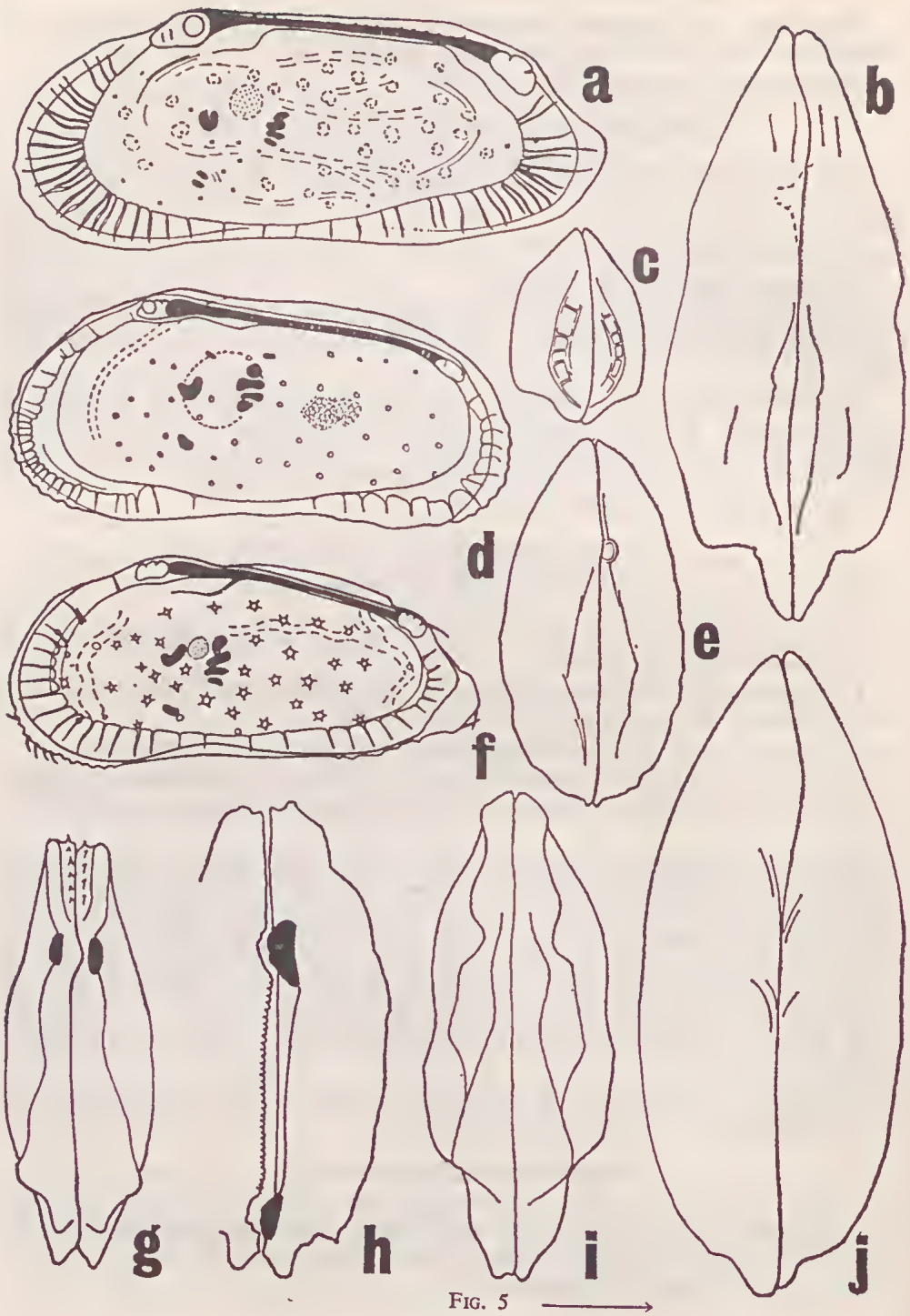

FIG. 5 ⟶

DIAGNOSIS: A *Callistocythere* characterized by small-medium size; subquadrate shape, yellow-brownish colour; surface ornamentation a complex pattern of reticulations, ridges and furrows (as illustrated); dorsal margin slightly arched, inclined backwards; ventral margin sinuated medially; anterior broadly rounded; posterior rounded below, but making approximately a right angle with the dorsal margin posterodorsally; greatest height anteromedial, about ⅝ the length. In dorsal view narrowly subovate, greatest breadth approximately medial, slightly less than half the length. Internally: lamellae broad; vestibula exhibiting the lacunae typical of the genus in a pattern which is nearly constant for this species (hence important diagnostically at the species level); radial pore canals polyfurcated; normal pore canals scattered, sieve-like; RV hinge comprising an anterior element—consisting of 2 small rounded teeth followed by 2 small sockets and a final small tooth—a crenulate median furrow and a postjacent tooth, LV hinge complementary; muscle scars include 4 adductors, a V-shaped antennal scar and a single mandibular, dorsal scars not observed. Anatomically: 1st antenna with an elongate terminal joint; 2nd antenna expodite double-jointed, reaching scarcely to the distal 2nd endopodite joint, terminal claws strong and serrate distally; lower lip adorned with a beard of long hairs, mandible palp well developed; legs increasing in size and strength posteriorly; end of the female body bearing a short spine. Sex dimorphism poorly developed.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J72: length 0·44 mm, height 0·25 mm, breadth 0·20 mm; paratype, adult, Nat. Mus. Vic. Reg. No. J73; length 0·46 mm, height 0·26 mm, breadth 0·20 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: No species yet described resembles this either in surface ornamentation or internal features (lamellae particularly). The diversity of *Callistocythere* species also, in the protected environment afforded them by Port Phillip Bay, is similar to and complements their known diversity in such environments elsewhere (Müller 1894, Hanai 1957).

DISTRIBUTION: South-eastern Australia.

Callistocythere insolita sp. nov.

(Pl. 12, fig. 1; Fig. 3k)

DERIVATION OF NAME: For its several atypical external and internal carapace features; L. *insolita* = unusual.

MATERIAL: Seaholme, 7 individuals; Ricketts Point, 6 individuals.

FIG. 5—a, *Doratocythere foveata* gen. et sp. nov., Holotype, NMV J107, Internal RV, surface pitting indicated, × 90. b, *D. foveata*, same specimen before disarticulation, Dorsal view of carapace, × 90. c, *Microcytherura gawemuelleri* sp. nov., Topotype, Dorsal view of carapace, × 90. d, Campylocytherid sp., NMV J110, Internal RV, × 90. e, *Loxocythere hornibrooki* sp. nov., Topotype, Dorsal view of carapace, × 90. f, *'Doratocythere' venata* (Brady), Hypotype, NMV J109, Internal RV, showing star-shaped normal pore canals, × 90. g, *Cletocythereis curta* sp. nov., Holotype, NMV J102, Dorsal view of carapace before disarticulation, × 90. h, *'Doratocythere' venata* (Brady), Topotype, Dorsal view LV and RV, displaying hinge structure, × 90. i, *'Ambostracon' pumila* (Brady), Hypotype, NMV J100, Dorsal view of carapace, × 90. j, *Australocytheridea vandenboldi* gen. et sp. nov., ♀ Paratype, NMV J48, Dorsal view of carapace, × 90.

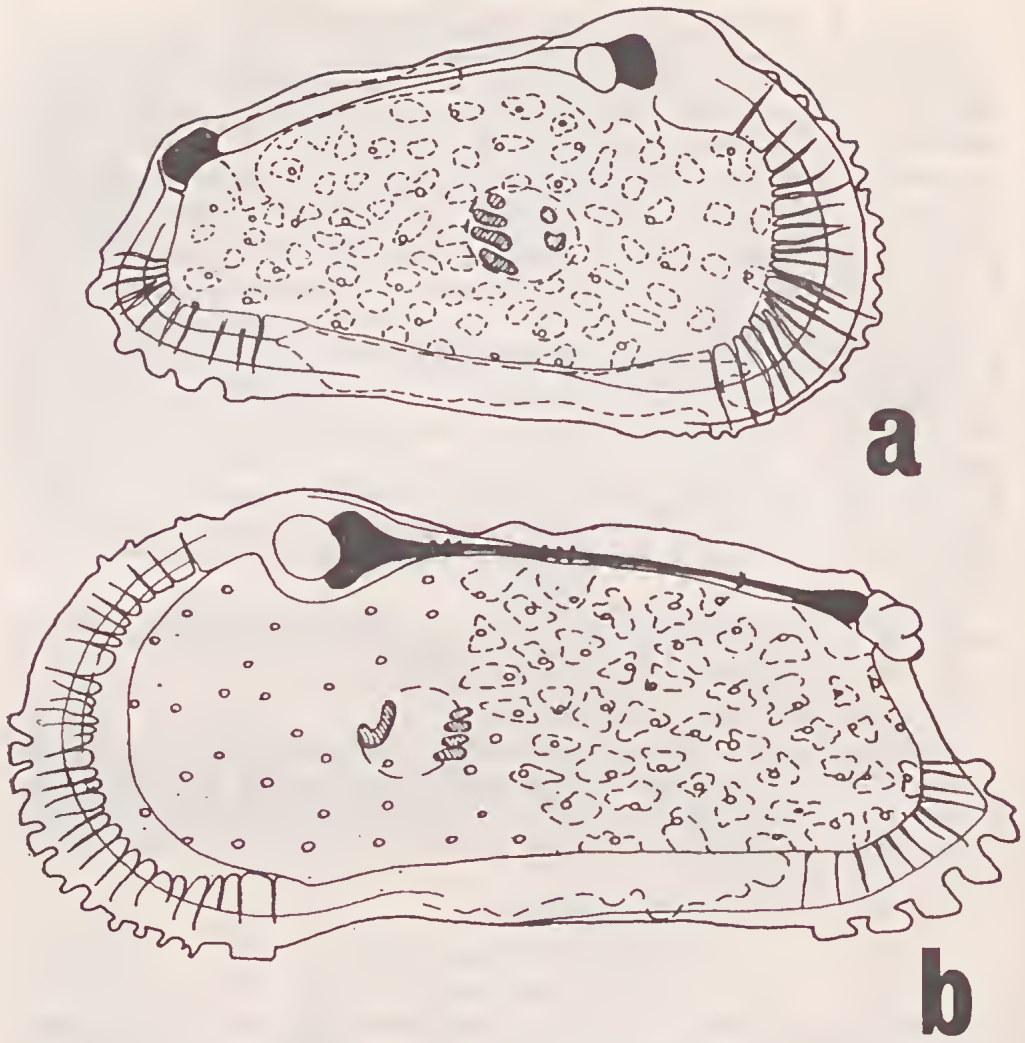

FIG. 6—a, *Cletocythereis curta* sp. nov., Holotype, NMV J102, Internal LV, surface ornament indicated, × 90. b, *Cletocythereis* cf. *rastromarginata* (Brady), ♂ Hypotype, NMV J101, Internal RV, surface ornament indicated posteriorly, × 90.

DIAGNOSIS: A *Callistocythere* species of medium size; subquadrate shape; yellowish-brownish colour; ornamented by several irregular low transverse ribs, and ventrally, one or two riblets which follow the margin, two of the ribs rising to fairly sharp peaks posteromedially; dorsal margin almost straight, gently inclined backwards; ventral margin inflexed anteromedially; anterior broadly rounded; posterior higher in LV than RV; greatest height anteromedial, about half the length. In dorsal view subovate; tapering in front, subtruncate behind; greatest breadth less than half the length. Internally: without lacunae; anterior and posterior vestibules well developed; radial pore canals short, branched anteroventrally and

posteriorly; normal pore canals scattered, sieve-like; anterior element of RV hinge consisting of a socket, tooth, crenulate ridge and 3 sockets and followed by a postjacent crenulate median furrow (which rises towards the rear) and a posterior tooth, LV hinge complementary; muscle scars typical of the genus. Anatomically, unknown. Sex dimorphism not noted.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J74: length 0·68 mm, height 0·34 mm, breadth 0·29 mm; paratype, adult, Nat. Mus. Vic. Reg. No. J75: length 0·65 mm, height 0·34 mm, breadth 0·28 mm.

TYPE LOCALITY: Swash mark, Ricketts Point.

REMARKS: As far as the writer is aware, no other *Callistocythere* species has an external appearance resembling this species which is further differentiated by its atypical internal features (lamellae, vestibula, radial pore canals, hinge).

DISTRIBUTION: South-eastern Australia.

Genus **Hemicytheridea** Kingma 1948

'Hemicytheridea' portjacksonensis sp. nov.

(Pl. 12, fig. 6; Fig. 3 i-j)

Cythere demissa Brady, 1868; 1880, p. 66, Pl. 12, fig. 7 a-j (not *demissa*)
Hemicytheridea sp.; McKenzie, 1964, p. 448-453.

DERIVATION OF NAME: For the locality at which the 'Challenger' types were collected.

MATERIAL: Seaholme, 34 individuals; Ricketts Point, 4 individuals.

DIAGNOSIS: A *'Hemicytheridea'* of small-medium size; elongate subrectangular shape; carapace strongly reticulate throughout, with a small oblong transverse depression in the muscle scar region; height greatest anteromedially, nearly half the length. In dorsal view elongate subovate; tapering frontwards, subtruncate posteriorly; greatest breadth medial, about equalling the height. Internally: lamellae broad; vestibules prominent; radial pore canals short, widened at their bases, unbranched; normal pore canals scattered, sieve-like; hinge antimerodont, LV with crenulate terminal sockets and a crenulate median bar; muscle scars comprising 4 adductors, a V-shaped antennal scar and single mandibular, dorsal scars not observed. Anatomically unknown. Sex dimorphism present, females broader than males (most noticeable in 1st stage juveniles).

DIMENSIONS: Hypotypes, adults, Nat. Mus. Vic. Reg. No. J76: length 0·53 mm, height 0·24 mm, breadth 0·25 mm; length 0·50 mm, height 0·24 mm, breadth 0·21 mm; 1st stage juvenile: length 0·46 mm, height 0·23 mm, breadth 0·24 mm.

REMARKS: *Cythere demissa* Brady, 1868 was described from Mauritius. The type slide contains 13 specimens referrable to 4 species, only 2 individuals matching the type description and type illustration of *C. demissa* which is denticulate posteroventrally. Neither the Victorian specimens, nor the 'Challenger' material referred by Brady to *C. demissa*, possess this feature, however, and they differ further from the lectotype in general shape, details of surface ornamentation and internal details. Specimens from Oyster Harbour, near Albany, Western Australian (McKenzie *op. cit.*) appear to be identical with the Victorian species, except that they are slightly smaller.

DISTRIBUTION: Southern Australia, (?) New Zealand (Hornibrook 1952, p. 17).

Subfamily Loxoconchinae Sars, 1925

Genus **Loxoconcha** Sars 1866

Loxoconcha australis Brady 1880

(Pl. 12, figs. 10, 11; Fig. 3n-o, Fig. 9h-s)

Loxoconcha australis Brady, 1880, p. 119, Pl. 28, figs. 5a-f, Pl. 29, figs. 3a-d. *Loxoconcha* sp. 1 McKenzie, 1964, p. 448-453.

Material: Seaholme, 14 individuals; Rieketts Point, 15 individuals.

Dimensions: Hypotypes, adult ♀, Nat. Mus. Vie. Reg. No. J77: length 0·70 mm, height 0·40 mm, breadth 0·36 mm; adult ♂, Nat. Mus. Vie. Reg. No. J77: length 0·76 mm, height 0·40 mm, breadth 0·36 mm.

Remarks: The 'Challenger' specimens came from Port Jackson and off Booby Island, and the species also occurs in Oyster Harbour, Western Australia, so that the present records bridge neatly the gap in the distribution of this species.

Distribution: Southern, south-eastern and (?) eastern Australia. It has also been recorded from Noumea (Brady 1890, p. 507, 520) but on examining the Noumean types these were found to differ consistently in shape and surface reticulation from the southern Australian material.

Loxoconcha sp.

(Pl. 11, fig. 9)

Material: Seaholme, 1 individual; Rieketts Point, 1 individual.

Diagnosis: A *Loxoconcha* of medium size; subrhomboid shape; finely pitted surface ornament; with a flattened eye tubercle; greatest height medial, about half the length. In dorsal view labiate (slightly depressed medially); greatest breadth about ⅔ the height. Internally and anatomically not known.

Dimensions: Adult, Nat. Mus. Vie. Reg. No. J78: length 0·64 mm, height 0·33 mm, breadth 0·23 mm.

Locality: Swash mark, Rieketts Point.

Remarks: This species belongs in the same group as *L. elliptica* Brady, *L. turbida* Müller, and *L. lenticulata* LeRoy, but can be readily distinguished from these species by its surface ornamentation pattern and distinctive appearance in dorsal view.

Loxoconcha cf. **variolata** Brady 1878

(Pl. 12, fig. 3; Fig. 4j)

Loxoconcha variolata Brady, 1878, p. 400, Pl. 68, figs. 4a-d; 1880, p. 121, Pl. 29, figs. 6a-d.

Material: Seaholme, 9 individuals, Rieketts Point, 18 individuals.

Diagnosis: A *Loxoconcha* of medium size; subrhomboid shape; inflated ventrally; surface reticulate, marked by a sharp posteroventral peak (ventrally the reticulations are arranged longitudinally); with a weak eye tubercle; height more than half the length. In dorsal view subhastate; greatest breadth posteromedial, equal to the height. Internally: lamellae broad; both anterior and posterior vestibules present, the former larger; radial pore canals straight, widened at their bases, widely spaced; normal pore canals scattered, sieve-like; hinge gongylodont; muscle scars comprising 4 adductors and a broadly V-shaped antennal scar, others not observed. Anatomically unknown. Sex dimorphism not noted.

DIMENSIONS: Hypotypes, adults, Nat. Mus. Vic. Reg. No. J79: length 0·54 mm, height 0·30 mm, breadth 0·28 mm; length 0·51 mm, height 0·30 mm, breadth 0·28 mm.

REMARKS: There seems to be little doubt that the present material is identical with the 'Challenger' specimens described by Brady, but it seems most unlikely that these are identical with the fossil Antwerp Crag species. Since a new name for the Australian forms may well be warranted, the referral above is highly tentative.

DISTRIBUTION: South-eastern and eastern Australia, (?) Neogene of Europe.

Loxoconcha trita sp. nov.

(Pl. 11, fig. 10; Fig. 3m)

DERIVATION OF NAME: For its general lack of distinguishing characters—L. *tritum* = commonplace.

MATERIAL: Seaholme, 5 individuals.

DIAGNOSIS: A subrhomboid *Loxoconcha* of medium size, reticulate surface, with flat eye tubercles and a posteroventral ridge, denticulate antero- and posteroventrally. In dorsal view amygdaloidal; greatest breadth medial, slightly less than the height (which is about $\frac{3}{5}$ the length). Internally: generally similar to *L. australis* but differing in details (lamellae, anterior vestibule, radial pore canals, normal pore canal pattern, etc.). Anatomically unknown. Sex dimorphism not noted.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J80: length 0·55 mm, height 0·33 mm, breadth 0·30 mm; paratypes, adults, Nat. Mus. Vic. Reg. No. J81: length 0·53 mm, height 0·33 mm, breadth 0·29 mm; length 0·54 mm, height 0·31 mm, breadth 0·29 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: Neither the 'Challenger' species nor the New Zealand species described by Hornibrook (*op. cit.* p. 49) resemble this species which is distinguished, paradoxically, by its relatively featureless carapace.

DISTRIBUTION: South-eastern Australia.

Loxoconcha gilli sp. nov.

(Pl. 12, fig. 4; Fig. 4k)

DERIVATION OF NAME: For Mr E. D. Gill, F.G.S., Assistant Director of the National Museum of Victoria.

MATERIAL: Seaholme, 3 individuals.

DIAGNOSIS: A *Loxoconcha* species characterized by small size; subquadrate shape in lateral view; inflated ventrally; surface ornamented by reticulations and riblets (as illustrated), reaching a peak posteroventrally from which it falls away posteriorly in 3 uneven steps; eye tubercle weak; shallow dorsomedial sulcus present; dorsal and ventral margins nearly straight, narrowing posteriorly; anterior broadly rounded; posterior subrounded; greatest height anteromedial, about $\frac{5}{9}$ the length. In dorsal view subhastate; tapered anteriorly, stepped posteriorly; greatest breadth posteromedial, about equal to the height. Internally: generally similar to *L. australis*. Anatomically unknown. Sex dimorphism not observed.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J82: length 0·43 mm, height 0·25 mm, breadth 0·25 mm; paratype, adult, Nat. Mus. Vic. Reg. No. J83: as for holotype.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: Easily separated from other species by its unusual surface sculpture.

DISTRIBUTION: South-eastern Australia.

Genus **Loxoconchella** Triebel 1954

Loxoconchella pulchra sp. nov.

(Fig. 4c)

DERIVATION OF NAME: L. *pulchra* = beautiful.

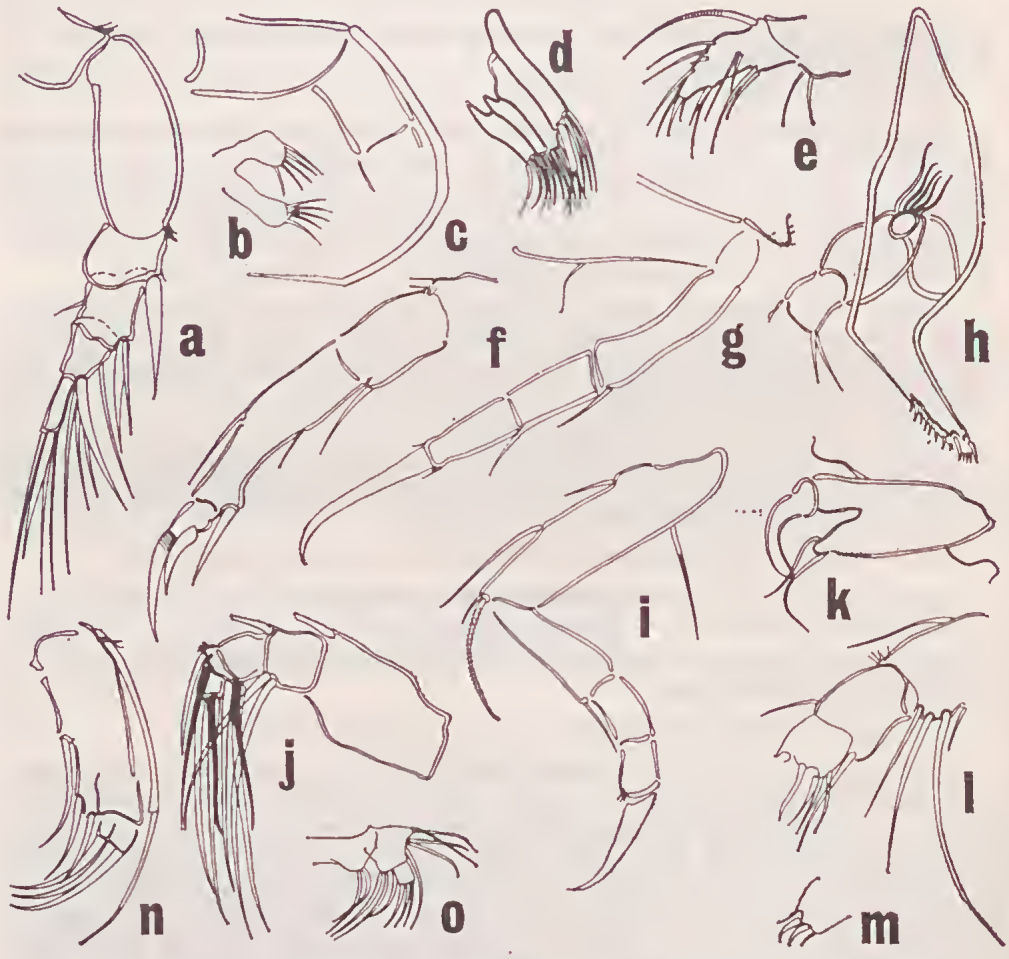

FIG. 7—a-i, *Loxocythere hornibrooki*, ♂ Holotype, NMV J45, × 400. a, 1st antenna. b, Brush-shaped organs. c, 2nd antenna, displaying exopodite. d, Maxilla, palp and lobes. e, Mandible palp. f, Distal 2nd antenna. g, P III. h, Mandible coxale. i, P I. j-m, *Australoecia victoriensis* gen. et sp. nov., ♂ Paratype, NMV J44, × 400. j, 1st antenna, some bristles shaded to avoid confusion of detail. k, Left palp, ♂ 2nd maxilla. l, Part of 2nd antenna. m, Distal furca. n-o, *Parakrithella australis* sp. nov., ♀ Holotype, NMV J50, × 400. n, Distal 2nd antenna and exopodite. o, Mandible palp.

MATERIAL: Ricketts Point, 15 individuals.

DIAGNOSIS: A *Loxoconchella* characterized by medium size; rounded-subrhomboid shape in lateral view; smooth shell, with numerous scattered pits; patches of reddish pigment in some individuals; dorsum gently convex; venter sinuated anteromedially; anterior broadly rounded; posterior obliquely rounded below and inflexed above, ending in a short, truncate, subdorsal process; greatest height posteromedial, 5/7 the length. In dorsal view subelliptical; greatest breadth medial, about half the length. Internally: lamellae broad; line of concrescence scalloped, nowhere coincident with the regular inner margin; radial pore canals polyfurcated; normal pore canals numerous, sieve-like; hinge adont; muscle scars comprising 4 adductors and an antennal scar, others not seen. Anatomically not known. Sex dimorphism present, females higher than males.

DIMENSIONS: Holotype, adult ♂, Nat. Mus. Vic. Reg. No. J84: length 0·54 mm, height 0·37 mm, breadth 0·28 mm; paratypes, adult ♂, Nat. Mus. Vic. Reg. No. J85: length 0·53 mm, height 0·37 mm, breadth 0·26 mm; adult ♀ (disarticulated), Nat. Mus. Vic. Reg. No. J85: length 0·53 mm, height 0·40 mm.

TYPE LOCALITY: Swash mark, Ricketts Point.

REMARKS: There are at least two species groups in *Loxoconchella*, the first characterized by a large dorsomedial boss on each valve (*L. anomala* Brady, *L. dorsobullata* Hartmann), the other without this boss. The present material belongs in the second group (together with *L. honoluluensis* Brady, the type species) but differs from *L. honoluluensis* in that it is smaller, more inflexed posterodorsally, and lacks the typical surface patch pattern of that species.

DISTRIBUTION: South-eastern Australia.

Subfamily PARADOXOSTOMATINAE Brady and Norman, 1889

Genus **Paradoxostoma** Fischer 1855

Paradoxostoma romei sp. nov.

(Fig. 4e, Fig. 8 i-r)

DERIVATION OF NAME: For Dom Remaele Rome, O.S.B., ostracode neontologist, the Catholic University, Louvain.

MATERIAL: Seaholme, 2 individuals; Ricketts Point, 2 individuals.

DIAGNOSIS: A *Paradoxostoma* of medium size; elongate ovate shape; smooth surface; pallid to pale brownish colour; dorsum gently convex; venter straight; anterior rounded; posterior subacuminate posterodorsally; greatest height slightly less than half the length. In dorsal view subelliptical; greatest breadth medial, about 5/8 the height—thus this species is broader (with respect to its height and length) than most others described in the genus. Internally: lamellae broad; inner margin regular; line of concrescence following the outer valve margin; radial pore canals few, very short; normal pore canals few, scattered, simple; hinge lophodont with an anterior antislip ridge in the RV, behind the anterior element, LV complementary; muscle scars comprising 4 adductors and 2 (?) antennal scars, others not seen. Anatomically: 1st antenna long and narrow, 4th joint longer than others (2nd-6th); 2nd antenna with a jointed exopodite, reaching almost to the tips of the terminal endopodite claws, 2nd endopodite joint long and narrow; mandible with a slender coxale and rudimentary palp; maxilla with slender lobes, the innermost with 2 setae, the 2nd and 3rd each bearing 3 setae; 1st leg with a very strong dorsodistal spine

on the 1st joint; legs increasing in length posteriorly; generic status confirmed by the typical suctorial disc of the mouth parts. Sex dimorphism weak.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J86; length 0·65 mm, height 0·31 mm, breadth 0·26 mm; paratype, disarticulated ♀ adult, Nat. Mus. Vic. Reg. No. J87; length 0·69 mm, height 0·30 mm.

TYPE LOCALITY: Swash mark, Ricketts Point.

REMARKS: Few species of this subfamily have been described from the region (Benson 1964b, 397-405, 414-417) and of these only *P. antarcticum* Müller, 1908, even slightly resembles the present species. The sub-family as a whole is always closely associated with the phytobenthos.

DISTRIBUTION: South-eastern Australia.

Paradoxostoma commune sp. nov.

(Fig. 4h)

DERIVATION OF NAME: Since it occurs more frequently than any other paradoxostomatinid in the collections—L. *communis* = common.

MATERIAL: Seaholme, 5 individuals; Ricketts Point, 2 individuals.

DIAGNOSIS: A *Paradoxostoma* characterized by medium size; elongate-ovate shape in lateral view; smooth shell; pallid to straw colour; dorsum evenly convex; venter weakly sinuated anteromedially; anterior more narrowly rounded than the posterior; greatest height posteromedial, distinctly less than half the length. In dorsal view narrowly elliptical; ends subacuminate; greatest breadth posteromedial, about $\frac{2}{3}$ the height. Internally: lamellae broad; line of concrescence and radial pore canals developing a distinctive pattern (as illustrated); normal pore canals scattered, simple; LV hingement without an antislip ridge behind the anterior socket; 4 adductor muscle scars present, other scars not observed. Anatomically unknown. Sex dimorphism not noted.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J88: length 0·51 mm, height 0·23 mm, breadth 0·15 mm; paratype, adult, Nat. Mus. Vic. Reg. No. J89: length 0·49 mm, height 0·20 mm, breadth 0·14 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: This species is closest to *P. fuscum* Müller, but differs from it in the absence of colour-banding and in the internal pattern developed by the line of concrescence and the radial pore canals. *P. ovatum* Brady, has a less elongate shell.

DISTRIBUTION: South-eastern Australia.

Paradoxostoma trapezoideum sp. nov.

(Fig. 4i)

DERIVATION OF NAME: For its general shape in lateral view.

MATERIAL: Seaholme, 3 individuals.

DIAGNOSIS: A *Paradoxostoma* of small-medium size; trapezoid shape in lateral view; smooth shell; straw to pale brownish colour; dorsum short and straight; venter weakly sinuated medially; anterior rounded; posterior subacuminate; greatest height medial, much less than half the length. In dorsal view resembling the previous species, *P. communis*, except that the greatest breadth is medial. Internally: lamellae broad; line of concrescence and radial pore canals developing the distinctive pattern illustrated; normal pore canals as in previous species; hinge lophodont, without an

ancillary antislip ridge; muscle scars comprising 6 dorsal scars, in addition to the usual adductor group of 4. Anatomically unknown. Sex dimorphism not noted.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J90: length 0·45 mm, height 0·16 mm, breadth 0·13 mm; paratype, adult, Nat. Mus. Vic. Reg. No. J91: length 0·43 mm, height 0·16 mm, breadth 0·11 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: The shape of this species in lateral view and the internal lamellar pattern are unique.

DISTRIBUTION: South-eastern Australia.

Genus **Cytherois** G. W. Müller 1884

Cytherois dissimilis sp. nov.

(Fig. 4 l)

DERIVATION OF NAME: Because it is distinctly inequivalved—L. *dissimilis* = unlike.

MATERIAL: Seaholme, 5 individuals; Ricketts Point, 1 individual.

DIAGNOSIS: A species of *Cytherois* of small size; subovate shape; smooth shell; pallid to pale brownish colour; inequivalved, RV higher than LV, overreaching it dorsally; dorsal margins arched (more strongly in RV than LV); venter nearly straight; both ends narrowly rounded in LV; anterior narrowly but posterior broadly rounded in RV; greatest height medial, about half the length (LV) or more than half the length (RV). In dorsal view narrowly ovate; greatest breadth just posteromedial, about $\frac{2}{5}$ the length. Internally: lamellae broad; anterior and posterior vestibules present; radial pore canals short, widened at their bases; normal pore canals scattered, simple; hinge lophodont; muscle scars comprising 4 adductors, a large antennal scar and 2 mandibulars, dorsal scars not observed. Anatomically unknown. Sex dimorphism not observed.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J92: length 0·41 mm, height 0·19 mm (LV), 0·23 mm (RV), breadth 0·16 mm; paratype, adult, Nat. Mus. Vic. Reg. No. J93; length 0·39 mm, height 0·21 mm, breadth 0·15 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: This species is easily separated on the grounds of shape, lamellar pattern and marked RV overlap from the classic species described by Müller (1894, 1908) and Sars (1928).

DISTRIBUTION: South-eastern Australia.

Cytherois bonaducci sp. nov.

(Fig. 4m)

DERIVATION OF NAME: For Dr G. Bonaducc, Stazione Zoologica, who kindly provided topotypic material of several of the paradoxostomatinids from the Bay of Naples described by G. W. Müller in his classic monograph (1894).

MATERIAL: Seaholme, 6 individuals.

DIAGNOSIS: A *Cytherois* characterized by small size; elongate ovate shape in lateral view; smooth shell; pallid to straw colour; inequivalved, RV slightly higher than LV posteromedially; dorsum evenly convex; venter sinuated anteromedially; anterior more narrowly rounded than the posterior; greatest height posteromedial, about $\frac{1}{3}$ the length. In dorsal view narrowly ovate; greatest breadth posteromedial at

⅔ the length from the front, and equal to slightly less than the height. Internally: lamellae broad; vestibules large; radial pore canals short, widened at their bases; normal pore canals scattered, simple; hinge lophodont; muscle scars as in previous species, additionally 4 dorsal scars were observed. Anatomically unknown. Sex dimorphism not noted.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J94: length 0·44 mm, height 0·14 mm, breadth 0·13 mm; paratype, adult, Nat. Mus. Vic. Reg. No. J95: length 0·39 mm, height 0·13 mm, breadth 0·13 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: This species is generally similar to *C. frequens* Müller, *C. vitrea* Sars and *C. pusilla* Sars, but can be separated on the grounds of slight differences in general shape and in the internal lamellar pattern.

DISTRIBUTION: South-eastern Australia.

Genus **Paracytherois** G. W. Müller 1894

Paracytherois portphillipensis sp. nov.

(Fig. 4d, g)

DERIVATION OF NAME: For the locality, Port Phillip Bay, Victoria.

MATERIAL: Seaholme, 3 individuals.

DIAGNOSIS: A species of *Paracytherois* of small-medium size; elongate subovate shape; smooth shell; pallid to straw colour; valves subequal; dorsum arched; venter sinuated anteromedially; anterior more narrowly rounded than the posterior; greatest height posteromedial, less than half the length. In dorsal view narrowly ovate; greatest breadth at slightly less than ⅔ the length from the front, equalling about ¾ the height. Internally: lamellae broad; anterior vestibule wide and deep, posterior vestibule elongate and narrow; radial pore canals short, widened at their bases; normal pore canals scattered, simple; hinge lophodont; muscle scars comprising 5 adductors in an inclined row trending anteroventrally (characteristic of the genus) and at least 2 dorsal scars, others not observed. Anatomically unknown. Sex dimorphism not noted.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J96: length 0·46 mm, height 0·21 mm, breadth 0·16 mm; paratype, adult, Nat. Mus. Vic. Reg. No. J97: length 0·46 mm, height 0·21 mm, breadth 0·15 mm.

REMARKS: The only described species with a closely similar shape is *Paracytherois similis* Müller (an Antarctic form) which is easily distinguished from the present species by its deeply incised ventral line of concrescence.

TYPE LOCALITY: Tide pool, Seaholme.

DISTRIBUTION: South-eastern Australia.

Subfamily MICROCYTHERINAE Klie, 1938

Genus **Microcythere** G. W. Müller 1894

Microcythere macphersoni sp. nov.

(Fig. 3h)

DERIVATION OF NAME: For Miss H. Macpherson (now Mrs I. Black), Curator of Molluses, the National Museum of Victoria, when the collections were made.

MATERIAL: Seaholme, 13 individuals.

DIAGNOSIS: A species of *Microcythere* characterized by small size; narrowly subtriangular shape in lateral view; smooth shell, with a prominent shallow, trans-

verse medial sulcus; pallid to brownish colour; valves sub-equal; dorsum arched; venter gently convex; ends subacuminate; greatest height just posteromedial, approximately equal to the height. Internally: lamellae broad anteriorly and posteriorly, narrow ventrally; anterior and posterior vestibules prominent, subequal; radial pore canals short, widened at their bases, normal pore canals scattered, simple; hinge strongly lophodont; musele scars comprising 4 adductors, a large heart-shaped antennal scar and 2 mandibulars, dorsal scars not observed. Anatomically unknown. Sex dimorphism marked, females higher and broader than males.

DIMENSIONS: Holotype, adult ♀, Nat. Mus. Vic. Reg. No. J98: length 0·33 mm, height 0·18 mm, breadth 0·19 mm; paratypes, Nat. Mus. Vic. Reg. No. J99: adult ♀: length 0·33 mm, height 0·18 mm, breadth 0·18 mm; adult ♂: length 0·31 mm, height 0·15 mm, breadth 0·14 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: The finest series of descriptions of species in this genus is still that of Müller, who named 9 species when first establishing the genus, and subsequently a tenth (Müller 1894, 1908). These and all other described *Microcythere* species differ from the present species in details of general shape, internal lamellar pattern and normal pore canal pattern. Like the Paradoxostomatinae, members of this subfamily also are closely associated with the phytobenthos in sublittoral environments, and further, often occur interstitially in the sediment substrate.

DISTRIBUTION: South-eastern Australia.

Subfamily HEMICYTHERINAE Puri, 1953

Genus **Ambostracon** Hazel 1962

'Ambostracon' pumila (G. S. Brady) 1866

(Pl. 12, fig. 8; Fig. 4b, Fig. 5i)

Cythere pumila G. S. Brady, 1866, p. 378, Pl. 60, figs. 7a-d.

MATERIAL: Seaholme, 21 individuals; Rieketts Point, 45 individuals.

DIMENSIONS: Hypotypes, Nat. Mus. Vic. Reg. No. J100, adult ♀: length 0·67 mm, height 0·38 mm, breadth 0·28 mm; adult ♂: length 0·65 mm, height 0·34 mm, breadth 0·25 mm.

LOCALITY: Tide pool, Seaholme.

REMARKS: *Ambostracon* species are characterized externally by an ornament of heavy ribs and intermediate reticulations, in contrast to *Mutilus* Neviani, which has a surface ornament of very strong reticulations only, and usually a less elongate carapace. Brady's species (type locality: Australia) differs from the others in surface sculpture and, internally, by the presence of fewer radial pore canals (about 55-65) than *A. costatum* Hazel, the type species *A. glauca* (Skogsberg) and *A. diegoensis* (LeRoy), all of which have about 75-100. A difference in the number of radial pore canals has already been used as a diagnostic character at generic level in the Hemicytherinae, viz., *Pokornyella* Oertli. Since some South African forms are similar to *'A'. pumila* in this respect further research may lead to the designation of a new generic or subgeneric category. The subfamily has been poorly represented in the Recent Australian marine faunules which I have examined so far, e.g., out of more than 200 species from Sahul Shelf only about 5 are Hemicytherinids; in the present faunule of about 50 species only one is a Hemicytherinid. This contrasts with an abundance of species off California and South Africa.

DISTRIBUTION: South-eastern Australia.

FIG. 8 ⟶

Subfamily TRACHYLEBERIDINAE Sylvester-Bradley, 1948

Genus **Cletocythereis** Swain 1963

Cletocythereis cf. **rastromarginata** Brady 1880

(Pl. 13, figs. 1-2; Fig. 6b, Fig. 10a-b)

Cythere rastromarginata Brady, 1880, p. 83, Pl. 16, figs. 1a-d (figs. 2a-d not *rastromarginata*). *Bradleya rastromarginata* (Brady); Hornibrook, 1952, p. 17.

MATERIAL: Ricketts Point, 5 individuals.

DIMENSIONS: Hypotypes, Nat. Mus. Vic. Reg. No. J101, adult ♂: length 0·80 mm, height 0·38 mm, breadth 0·25 mm; adult ♀: length 0·75 mm, height 0·38 mm, breadth 0·24 mm.

LOCALITY: Swash mark, Ricketts Point.

REMARKS: *Cletocythereis* species are characterized by the development in the LV of a prominent anterodorsal rim-tooth which protrudes over the RV margin, in addition to the normal amphidont hinge elements. This is an unusual feature in trachyleberidids, found only in *Idiocythere* and an as yet undescribed genus (*Cythere cristatella* Brady from Sahul Shelf) apart from its occurrence in *Cletocythereis*. These three categories can be separated on the presence or absence of an eye tubercle, type of surface ornamentation, width of inner lamellae, type and grouping of radial pore canals, details of the hinge and breadth of carapace. Further, *Idiocythere* is an exclusively fossil genus, ranging from the Upper Cretaceous to the Eocene (Triebel personal communication). *Cletocythereis*, however, apparently ranges from the Eocene-Recent (Hornibrook 1952, p. 19), while the category represented by *Cythere cristatella* Brady is probably restricted to the Neogene.

C. rastromarginata (the type species of *Cletocythereis*) was collected by the 'Challenger' off Honolulu, off East Moncoeur Island, and at Station 167 in New Zealand waters, but the latter record (notwithstanding Brady's comments) is evidently a different species. The genus is restricted to tropical and warm temperate waters in the Pacific, Indo-Pacific and Australasian regions so that *C. nobilissimus* Swain, which is Boreal, should be referred to another category.

DISTRIBUTION: Honolulu (?), South-eastern Australia.

Cletocythereis curta sp. nov.

(Fig. 5g, Fig. 6a)

DERIVATION OF NAME: For the relatively short carapace—L. *curta* = shortened.

MATERIAL: Seaholme, 3 individuals.

DIAGNOSIS: A *Cletocythereis* closely similar in appearance to the previous species but with a shorter heavier shell (less length/height ratio); also reticulate, but with the ridges of the reticulations wider so that the pits are uniformly smaller than in the previous species; the dorsal ridge more prominent at its posterodorsal corner in this species. Internally: without an anterior vestibule and with fewer,

FIG. 8—a-h, *Callistocythere hartmanni* sp. nov., ♀ Holotype, NMV J72, × 400. a, 1st antenna, some bristles shaded to avoid confusion of detail. b, 2nd antenna. c, Lower lip. d, P III. e, P I. f, P II. g, Spine, posterior of body. h, Mandible palp. i-r, *Paradoxostoma romei* sp. nov., ♀ Paratype, NMV J87, × 400. i, Suctorial disc. j, Part of 1st antenna. k, 2nd antenna. l, P I. m, P II. n, P III. o, Mandible coxale. p, Mandible palp. q, Maxilla 1st lobe. r, Maxilla 2nd and 3rd lobes. s-y, *'Doratocythere' venata* (Brady), ♀ Hypotype, NMV J109, × 400. s, P III. t, Mandible palp. u, 1st antenna. v, 2nd antenna. w, Lower lip. x, Spine, posterior of body. y, P I.

longer anterior radial pore canals; antennal muscle scar divided. Anatomically unknown. Sex dimorphism not as marked as in the previous species.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J102: length 0·63 mm, height 0·35 mm, breadth 0·23 mm; paratype, adult, Nat. Mus. Vic. Reg. No. J103: length 0·64 mm, height 0·34 mm, breadth 0·23 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: Although similar in many respects, in others this species differs consistently from the type species and warrants separate status. As far as I am aware it is shorter than any other species in the genus.

DISTRIBUTION: South-eastern Australia.

Genus **Ponticocythereis** gen. nov.

DERIVATION OF NAME: For Dr J. E. Hazel, United States Geological Survey, who has long recognized the distinctness of this category—Gk *ponticos* = hazel, and generic name *Cythereis*.

TYPE SPECIES: *Ponticocythereis militaris* (Brady), 1866.

DIAGNOSIS: A trachyleberidinid genus with a strong subquadrate carapace; ornamented by numerous coarse pointed or blade-like spines which project, continuously or discontinuously, around the entire margin of each valve and along a more or less distinct median ridge, the intervening areas perfectly smooth; eye tubercle large, round, glassy; subcentral tubercule present, sometimes obscured by the median ridge; height about half the length; selvage prominent; inner lamellae moderately broad; vestibules absent; radial pore canals tending to group; hinge holamphidont; antennal scar V-shaped; anatomically imperfectly known; distal joint of the 1st antenna elongate; endopodite joints of the 2nd antenna stouter than in *Cletocythereis*; unfortunately, nothing is known about the structure of the three paired posterior leg-like limbs, but there is a weak asymmetry in the valves which suggests that the left and right limbs of one or more of these pairs may also be asymmetrical. Asymmetry of one or more of the paired posterior limbs in trachyleberidinids has already been observed for several genera including *Trachyleberis* Brady, *Actinocythereis* Puri, *Costa* Neviani, *Buntonia* Howe and *Occultocythereis* Howe (Harding & Sylvester-Bradley 1953, p. 10; Müller 1894, Pl. 31; Hazel, personal communication).

REMARKS: This genus is closest to *Trachyleberis, Costa* and *Actinocythereis* in general shape, although there is little possibility of confusion with *Trachyleberis* which has a subacuminate posterior. Further its pattern of surface ornament (which is consistent in all known species) suffices to distinguish it from *Trachyleberis* which is spiny over the entire surface. In *Costa* the median ridge ends in a dog-leg posteriorly, and the intervening areas are often reticulate. *Actinocythereis* is higher with respect to its length, has a thicker shell, and is often ornamented with numerous tubercules. Internally: all are rather similar, except that in the present genus radial pore canals show a tendency to group (as illustrated).

DISTRIBUTION: Pacific, Indo-Pacific, Australasia.

AGE: Tertiary to Recent.

Ponticocythereis militaris Brady 1866

(Pl. 13, fig. 4; Fig. 4 o, Fig. 10 c-d)

Cythereis militaris Brady, 1866, p. 385, Pl. 61, figs. 9a-d.
Cythere clavigera Brady, 1880, p. 109, Pl. 23, figs. 7a-d.

Cythere militaris Brady: Brady, 1890, p. 504, Pl. 2, figs. 24-26 (not *militaris*).
Trachyleberis clavigera (Brady); Hornibrook, 1952, p. 15.
Tracyleberis militaris (Brady); McKenzie, 1964, pp. 448-543 (not *militaris*).

MATERIAL: Seaholme, 6 individuals.

DIMENSIONS: Hypotypes, Nat. Mus. Vic. Reg. No. J104, adult ♂: length 1·00 mm, height 0·50 mm, breadth 0·43 mm; adult ♀ (LV): length 0·85 mm, height 0·48 mm.

REMARKS: Diagnostic characters for species in this genus include variations in the type and groupings of spines, particularly along the dorsal margin and the medial longitudinal ridge. Such variations suffice to distinguish *P. militaris* from the other described species *P. ichthyoderma* and *P. quadriserialis* (Brady 1890, p. 503, Pl. 2, figs. 22, 23 and p. 504, Pl. 2, figs. 27, 28). The form described and illustrated by Brady, 1890, as an adult female *C. militaris*, from specimens dredged at Princess Royal Harbour, near Albany, Western Australia (Brady *op. cit.*) is not *P. militaris* but another, unnamed, species which bears pointed spines dorsally rather than flattened bladelike spines as in *P. militaris*. On the other hand, *C. clavigera* Brady, collected by the 'Challenger' at Port Jackson, is identical with *C. militaris* (type locality: Hobsons Bay) as foreshadowed by Brady in his comments (Brady 1880, p. 110).

DISTRIBUTION: South-eastern Australia.

Subfamily XESTOLEBERIDINAE Sars, 1928

Genus **Xestoleberis** Sars 1866

Xestoleberis tigrina (Brady) 1866

(Fig. 4a, Fig. 10e-n)

Cytheridcis tigrina Brady, 1866, p. 369, Pl. 58, figs. 5a-d.

MATERIAL: Seaholme, 23 individuals; Ricketts Point, 52 individuals.

DIMENSIONS: Hyptotypes, Nat. Mus. Vic. Reg. No. J105, adult ♂: length 0·65 mm, height 0·36 mm, breadth 0·33 mm; adult ♀: length 0·63 mm, breadth 0·39 mm.

LOCALITY: Swash mark, Ricketts Point.

REMARKS: Direct comparison against Brady's types has shown that the present material is undoubtedly his species which was collected from 'Australia (littoral shell-sand Melbourne)'.

DISTRIBUTION: South-eastern Australia.

Xestoleberis briggsi sp. nov.

(Fig. 4n)

DERIVATION OF NAME: For W. Briggs, Jr., presently working on Neogene ostracodes of New Zealand.

MATERIAL: Seaholme, 4 individuals; Ricketts Point, 2 individuals.

DIAGNOSIS: A species of *Xestoleberis* characterized by small-medium size; narrowly ovate shape in lateral view; smooth surface; dorsal margin arched; ventral margin nearly straight; anterior narrowly rounded; posterior broadly rounded; eye scar present; greatest height approximately medial, about half the length. In dorsal view subovate; anterior tapered; posterior broadly rounded; greatest breadth posteromedial, little more than the height. Internally: lamellae broadest anteriorly;

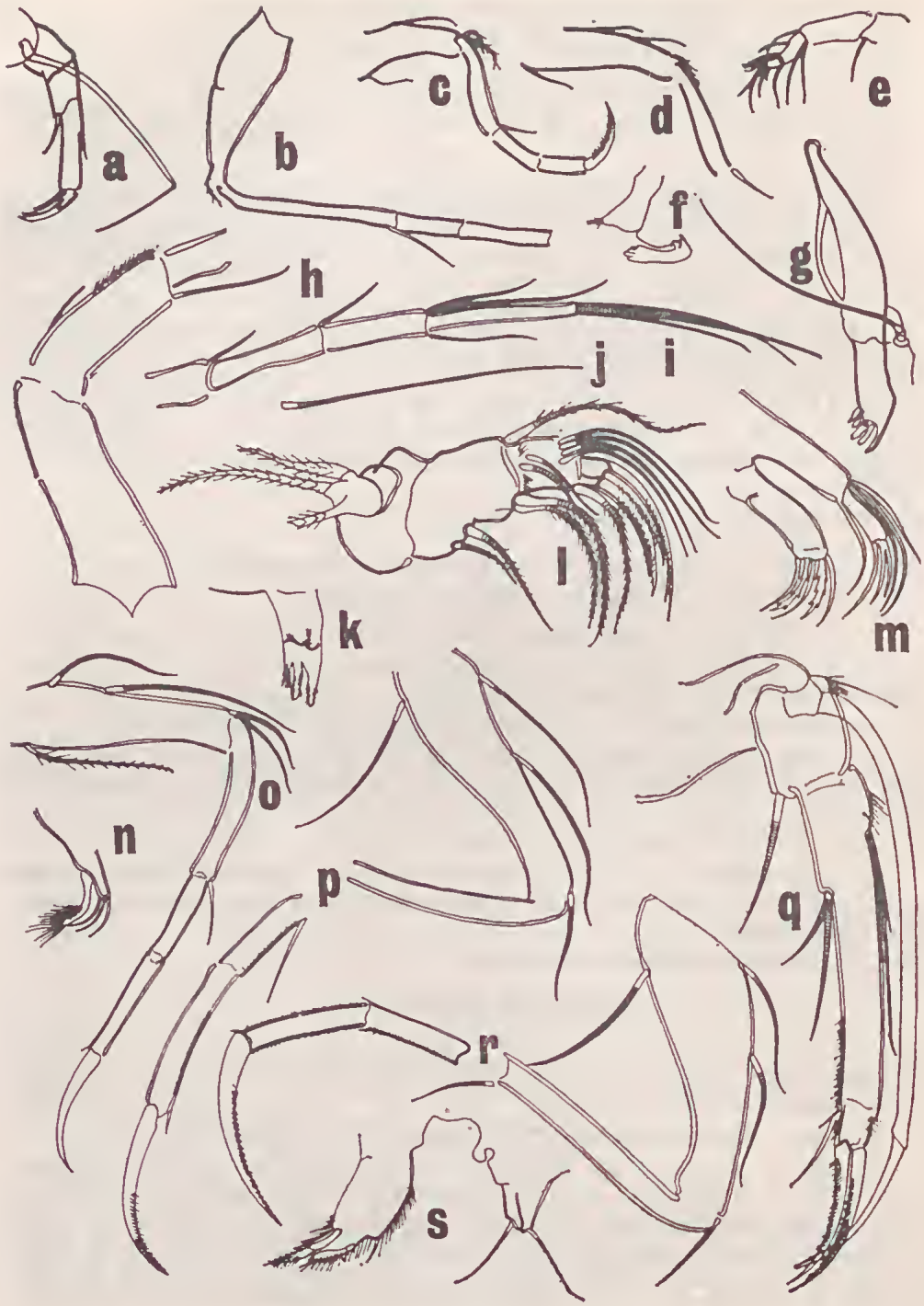

FIG. 9 ⟶

anterior vestibule prominent; radial pore canals simple, usually straight, most numerous anteroventrally; normal pore canals scattered, sieve-like; hinge merodont, LV with crenulate terminal sockets and an intervening crenulate bar, RV complementary; muscle scars large comprising 4 adductors, and a heart-shaped antennal scar, others not observed. Anatomically not known. Sex dimorphism present, females broader than males.

DIMENSIONS: Holotype, adult, Nat. Mus. Vic. Reg. No. J106: length 0·43 mm, height 0·21 mm, breadth 0·24 mm.

TYPE LOCALITY: Tide pool, Seaholme.

REMARKS: This species is smaller than, and generally dissimilar to the previous species, and also to *X. granulosa* Brady, 1880, which was taken off East Moncoeur Island, Bass Strait, and in Port Jackson. Some Noumea material, referred by Brady to *X. granulosa*, also differs from this species in shape and internal features (Noumea types examined).

DISTRIBUTION: South-eastern Australia.

Subfamily CAMPYLOCYTHERIDINAE Puri, 1960

Genus **Doratocythere** gen. nov.

DERIVATION OF NAME: For its hastate shape in dorsal view—Gk doru = a spear, and generic name *Cythere*.

TYPE SPECIES: *Doratocythere foveata* sp. nov.

DIAGNOSIS: A campylocytherinid genus characterized by medium-large size; elongate-subquadrate shape; ornament of scattered pits or reticulations; LV larger than RV; margins usually denticulate antero- and posteroventrally; height less than half the length; weak subcentral tubercule present; in dorsal view, outline of the valves is abruptly truncated at the rear (like a spearhead); inner lamellae broad anteriorly and posteriorly, narrower ventrally; adults without vestibules; radial pore canals moderately numerous (about 50 in all) long, wavy, often thickened, usually unbranched; normal pore canals simple; hinge amphidont, RV with a relatively weak stepped anterior tooth, crenulate median furrow and lobate posterior tooth; shell wall thickened behind and below the anterior hinge elements; observed muscle scars comprise 4 adductors, a V-shaped or U-shaped antennal scar, and one or two mandibulars; between the adductors and the antennal scar is a small, subcircular micropunctate area. Anatomically: distal (6th) joint of the 1st antenna elongate; lower lip hirsute; 2nd antenna with a well developed 3-jointed exopodite, in females reaching the distal 2nd endopodite joint, slightly longer in males (reaching the distal 3rd endopodite joint), male 2nd antenna endopodite more slender than the female 2nd antenna endopodite, terminal claws short and strong; mandible with an elongate distal joint on the palp, penultimate joint with 3 long feathered ventral bristles; epipodite with 2 long setae and a short seta; epipodial appendage of the maxilla with about 10 Strahlen; legs increasing in length towards the rear, chitin

FIG. 9—a-g, *Cytherura taylori* sp. nov., ♀ Paratype, NMV J53, × 400. a, 2nd antenna. b, P III (claw lost). c, P I. d, P II (proximal joints). e, Mandible palp. f, Rear of body. g, Mandible coxale and epipodial bristle. h-s, *Loxoconcha australis*, ♀ Hypotype NMV J77, × 400. h, Proximal 1st antenna. i, Distal 1st antenna, j, Longest distal bristle of 1st antenna. k, Lower mandible coxale. l, Mandible palp. m, Maxilla palp and 3rd lobe, displaying Zahnborsten. n, Maxilla, 1st lobe and brush-like process. o, P I. p, P II. q, 2nd antenna. r, P III. s, Rear of body (disoriented).

supports simple; female body ending in a short annulate bristle; penis with a broadly triangular anterobasal part.

Remarks: The thickened shell wall behind the anterior hinge elements is considered to be a diagnostic feature which relates this to other campylocytherinid genera such as *Tringylymus* Blake, *Campylocythere* Edwards and *Acuticythereis* Edwards. The anatomy shows several relationships to the Trachyleberidinae (as defined by Hartmann 1963, p. 138) supporting Puri's assessment on palaeontological grounds of the similarities between the two groups (Puri 1960). In many trachyleberidinid genera, however, the exopodite of the 2nd antenna is markedly different in length in the different sexes, and the penis structure of males also differs from that in *Doratocythere*. The trachyleberidinid genus closest to *Doratocythere* is *Moosella* Hartmann. Apart from a different penis structure, however, *Moosella* differs palaeontologically from the present genus in that: the inner lamellae are narrower, there is a less marked thickening of the shell wall behind the hinge, and there is no micro-punctate area between the adductors and the antennal scar. Width of the inner lamellae, lack of vestibules, and the micropunctate interscar area are sufficient to distinguish *Doratocythere* from the other camplyocytherinids mentioned above.

Distribution: Southern Australia, from Oyster Harbour, near Albany, Western Australia, to Port Phillip Bay, Victoria (for the known Recent species).

Age: Neogene to Recent.

Doratocythere foveata sp. nov.

(Pl. 13, fig. 3; Fig. 5a-b)

Derivation of Name: For the pitted surface—L. *fovea* = a pit.

Material: Seaholme, 7 individuals.

Diagnosis: A *Doratocythere* characterized by medium-large size, elongate subquadrate shape in lateral view; weakly denticulate anteroventrally, not noticeably so posteroventrally; surface somewhat irregular, truncated posteriorly and ornamented by scattered small deep pits; LV larger than RV, overlapping it dorsally and posterodorsally, posterodorsal margin of LV straight, not inflexed as in RV; dorsal margin sloping backwards; ventral margin sinuated anteromedially; anterior broadly rounded; posterior rounded (LV) or subcaudate (RV); greatest height anteromedial, much less than half the length. In dorsal view subhastate; lateral outlines of the valves slightly depressed behind the subcentral tubercule; valves asymmetrical; greatest breadth less than the height. Internally: lamellae broad; vestibules absent; radial pore canals as in the generic diagnosis; selvage distinct; flange present; normal pore canals scattered, simple, small in diameter; RV hinge consisting of stepped anterior tooth, crenulate median furrow and trilobate posterior tooth, LV complementary; shell wall thickened behind and below the anterior hinge elements; muscle scars comprising 4 adductors, an U-shaped antennal scar and 2 mandibulars; micropunctate interscar area present. Anatomically not known. Sex dimorphism not observed.

Dimensions: Holotype, adult, Nat. Mus. Vic. Reg. No. J107: length 0·88 mm, height 0·38 mm, breadth 0·34 mm; paratype, adult, Nat. Mus. Vic. Reg. No. J108: length 0·86 mm, height 0·35 mm, breadth 0·33 mm.

Type Locality: Tide pool, Seaholme.

REMARKS: The surface ornamentation suffices to distinguish this from the following species and from an undescribed species which also occurs in Port Phillip Bay. It closely resembles another undescribed species from King George Sound, near Albany, Western Australia, which however, is less high and has a much wider posteroventral shelf (0·09 mm against 0·04 mm), a different normal pore canal distribution and wider inner lamellae, especially posteroventrally.

'Doratocythere' venata (Brady) 1866

(Pl. 12, fig. 9; Fig. 5f, h, Fig. 8s-y)

Cythere venata Brady, 1866, p. 374, Pl. 59, figs. 8a-c.

MATERIAL: Scaholme, 21 individuals; Ricketts Point, 3 individuals.

DIMENSIONS: Hypotypes (?), 1st stage ♀, Nat. Mus. Vic. Reg. No. J109: length 0·70 mm, height (LV) 0·34 mm, (RV) 0·31 mm, breadth 0·31 mm.

REMARKS: In the writer's opinion all the specimens of this form which were collected at the two localities on which this paper is based are 1st and 2nd stage juveniles (i.e. in the final moult stages before adulthood). Brady's type material is a juvenile in the 2nd stage removed from adulthood. It is just possible in the writer's opinion, that *Doratocythere foveata* is the adult of *'Doratocythere' venata* but van den Bold considers them to be separate species for the following good reasons: the inner lamellae in *'D'. venata* are unusually wide if the specimens are juveniles, and a vestibule is present; the transverse anterior ridge/furrow of *'D'. venata* does not occur in *D. foveata*; *'D'. venata* has star-shaped normal pore canals, unlike *D. foveata*; the muscle scars have a different orientation in the two forms (van den Bold personal communication). The writer's original reasons for considering the two forms to be one and the same species were: the size difference was about right for *D. foveata* to be the adult of *'D'. venata*; there were no other 'juveniles' resembling *D. foveata* in the collections (nor have any since been found in a rapid look through about 50 samples from Port Phillip Bay), *'D'. venata* appears to have a juvenile hinge (merodont) for a camplocytherinid. However, Professor van den Bold's comments particularly on the muscle scar orientation and normal pore canals, are unanswerable. Brady's species is placed in *Doratocythere sensu lato*, because, although it is similar in general shape and has a micropunctate intersear area, the differences in lamellae, normal pore canals and hingement place it outside *Doratocythere, sensu stricto*.

DISTRIBUTION: South-eastern Australia.

Campylocytherinid sp.

(Pl. 12, fig. 7; Fig. 5d)

MATERIAL: Seaholme, 4 individuals.

DIAGNOSIS: A campylocytherinid of medium-large size, subquadrate shape in lateral view; ornament of weak reticulations, with each reticule microreticulate; a shallow transverse anterior furrow; subcentral tubercule present; margins denticulate antero- and posteroventrally; greatest height anteromedial, about half the length. In dorsal view broadly elliptical; narrower anteriorly than posteriorly; greatest breadth approximately medial, about equalling the height. Internally: lamellae broad, RV of specimen (opened) with vestibules (as illustrated), LV without vestibules; radial pore canals (LV) long, wavy; normal pore canals scattered, simple; hinge merodont with a crenulate median element; shell wall slightly thickened behind the anterior hinge elements; muscle scars comprising 4 adductors, a V-shaped antennal scar,

FIG. 10 ⟶

single mandibular and 2 other smaller scars. Anatomically unknown. Sex dimorphism weak, females broader than males.

DIMENSIONS: Nat. Mus. Vic. Reg. No. J110: 1st stage juvenile, ♀, length 0·75 mm, height 0·38 mm, breadth 0·40 mm; 1st stage juvenile, ♂: length 0·74 mm, height 0·36 mm, breadth 0·33 mm.

REMARKS: This species of which only juveniles were collected (2, 1st stage and 2, 2nd stage) is placed in the Campylocytheridinae on the basis of the slightly thickened shell wall behind the anterior hinge elements, but may be a trachyleberidinid. The weak hinge, immature inner lamellae and poorly developed surfaee ornamentation all suggest that the specimens are juveniles, and a more eritical appraisal of their status must await the finding of adult individuals (which would measure about 1mm).

DISTRIBUTION: South-eastern Australia.

Undescribed Species

In addition to those described above several other species occurred in the collections, in each case represented by single specimens only. These have been housed at the National Museum of Victoria as undescribed species (Seaholme: Reg. No. J111; Ricketts Point: Reg. No. J112). The Seaholme species are *Paradoxostoma* sp., *Paracytherois* sp., ? *Luvula* sp., *Hemicytherura* sp., and an undetermined eytherinid. At Ricketts Point were found *Leptocythere* sp., *'Aurila'* sp., *Doratocythere* sp., and an undetermined trachyleberidinid.

Conclusions

In all, 408 individuals were picked from the Seaholme collection and 276 from Ricketts Point material. These numbers represented a total (including 'undescribed species') of 57 species, of which 33 were present at Ricketts Point and 47 in the Seaholme faunule. Including 'undescribed species', 10 species were exclusive to Ricketts Point and 24 to Seaholme.

The number of specimens picked from each collection is adequate to interpret the assemblage at each locality (Kornicker 1964, p. 49 and Fig. 3). It is evident that the subfamilies Bairdiinae, Cytherellinae, Paracypridinae, Hemicytheridinae, Xestoleberidinae and the genus *Loxoconchella* characterize the Ricketts Point assemblage, while the subfamiles Cytherurinae, Leptocytherinae, Paradoxostomatinae, Microcytherinae, Campylocytheridinae and the genus *Ponticocythereis* typify the assemblage at Seaholme. Common at both localities are the subfamilies Pontocypridinae (minus *Propontocypris*), Cytherinae, Cytheridcinae, Krithinae and Loxoconchinae (minus *Loxoconchella*).

The commonest species are *Loxoconcha australis, Callistocythere puri, 'Ambostracon' pumila* and *Xestoleberis tigrina.* Characteristic littoral tide pool species include *Cytherura taylori, Microcytherura australis, Hemicytherura seaholmensis, Leptocythere vellicata, Hemicytheridea portjacksonensis, Microcythere macphersoni, 'Doratocythere' venata.* Characteristie sublittoral species are *Bairdia* sp., *Cytherelloidea keiji, Paracypris bradyi, Loxoconchella pulchra.* In addition, some

FIG. 10—a-b, *Cletocythereis* cf. *rastromarginata* (Brady), ♂ Hypotype, NMV J101, × 400. a, 1st antenna. b, 2nd antenna. c-d, *Ponticocythereis militaris* (Brady), gen. nov., ♀ Hypotype, NMV J104, × 400. c, 1st antenna. d, 2nd antenna endopodite. e-n, *Xestoleberis tigrina* (Brady), ♀ Hypotype, NMV J105, × 400. e, Mandible coxale. f, Mandible epipodite. g, 1st antenna. h, Mandible palp. i, Lower lip. j, 2nd antenna. k, P II. l, P III. m, P I. n, Maxilla, proximal palp and lobes.

less common species are characteristic of the environment as a whole, e.g., *Loxocythere hornibrooki, Australocytheridea vandenboldi, Parakrithella australis* and *Ponticocythereis militaris.*

Although 57 species may seem to be an adequate ostracode faunule for this protected environment a cursory glance through samples collected by the National Museum of Victoria in its Port Phillip Bay survey has revealed many species not considered here. It is my hope to study these later.

Acknowledgements

The research has been undertaken during my tenure as inaugural Shell Research Fellow at Monash University. Grants-in-aid have been provided by Delhi Australian Petroleum Pty. Limited, Mobil Exploration Pty. Limited, and Alliance Oil Management Pty. Limited. The final draft of the manuscript was typed by Miss G. Meredith. Charles McCubbin inked my original drawings; W. Bennett drafted Fig. 1.

The paper is dedicated to the many taxonomists who have given and continue to give freely of their advice and encouragement.

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Explanation of Plates

PLATE 11

All magnifications × 95 approximately

FIG. 1—*Cytherelloidea keiji* sp. nov. Adult ♀, paratype, NMV J35. External lateral view, LV.
FIG. 2—*Loxocythere hornibrooki* sp. nov. Adult ♀, holotype, NMV J45. External lateral view, LV.
FIG. 3—*Cytherura taylori* sp. nov. Adult ♀, paratype, NMV J53. External lateral view, LV.
FIG. 4—*Semicytherura cryptifera* (Brady), 1880. Adult, hypotype, NMV J54. External lateral view, RV.
FIG. 5—*Semicytherura* sp. Adult, NMV J55. External lateral view, LV.
FIG. 6—*Semicytherura angusta* sp. nov. Adult, holotype, NMV J58, External lateral view, LV.
FIG. 7—*Semicytherura tenuireticulata* sp. nov. Adult, paratype, NMV J57. External lateral view, LV.
FIG. 8—*Hemicytherura sealholmensis* sp. nov. Adult, paratype, NMV J63. External lateral view, RV.
FIG. 9—*Loxoconcha* sp. Adult, NMV J78. External lateral view, RV.
FIG. 10—*Loxoconcha trita* sp. nov. Adult, holotype, NMV J80. External lateral view, LV.
FIG. 11—*Microcytherura australis* sp. nov. Adult, holotype, NMV J64. External lateral view, LV.
FIG. 12—*Microcytherura gawemuelleri* sp. nov. Adult, paratype, NMV J67. External lateral view, RV.
FIG. 13—*Australocytheridea vandenboldi* gen. et sp. nov. Adult ♂, holotype, NMV J47. External lateral view, LV.

PLATE 12

All magnifications × 95 approximately

FIG. 1—*Callistocythere insolita* sp. nov. Adult, holotype, NMV J74. External lateral view, LV.
FIG. 2—*Callistocythere puri* sp. nov. Adult, hypotype, NMV J71. External lateral view, LV.
FIG. 3—*Loxoconcha* cf. *variolata* Brady, 1878. Adult, hypotype, NMV J79. External lateral view, LV.
FIG. 4—*Loxoconcha gilli* sp. nov. Adult, paratype, NMV J88. External lateral view, LV.
FIG. 5—*Callistocythere hartmanni* sp. nov. Adult ♀, holotype, NMV J72. External lateral view, RV.
FIG. 6—*'Hemicytheridea' portjacksonensis* sp. nov. Adult ♀, hypotype, NMV J76. External lateral view, LV.

FIG. 7—Campyloeytherinid sp. Adult, NMV J110. External lateral view, LV.
FIG. 8—*'Ambostracon' pumila* (Brady), 1866. Adult ♀, hypotype, NMV J100. External lateral view, RV.
FIG. 9—*'Doratocythere' venata* (Brady), 1866. Adult ♀, hypotype, NMV J109. External lateral view, LV.
FIGS. 10-11—*Loxoconcha australis* Brady, 1880. Hypotypes, NMV J77. Fig. 10: adult ♀, external lateral view, LV. Fig. 11: adult ♂, external lateral view, RV.

PLATE 13

All magnifieations, except Fig. 2, × 95 approximately

FIGS. 1-2—*Cletocythereis* cf. *rastromarginata* (Brady), 1880. Hypotypes, NMV J101. Fig. 1: adult ♂, external lateral view, RV. Fig. 2: adult ♀, external lateral view, RV, enlarged to same size as male to show sex dimorphism.
FIG. 3—*Doratocythere foveata* gen. et sp. nov. Adult holotype, NMV J107. External lateral view, RV.
FIG. 4—*Ponticocythereis* gen. nov. *militaris* (Brady), 1866. Adult ♂, hypotype, NMV J104. External lateral view, RV.